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A SYSTEMATIC REVISION OF THE GENUS *LAELAPS* S. STR. (ACARI: MESOSTIGMATA) OF THE ETHIOPIAN REGION[1]

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Abstract.— This paper presents the results of a systematic study of mites of the genus *Laelaps* s. str. collected from small mammals of the Ethiopian region. Specimens taken from approximately 100,000 small mammals were examined from a wide variety of habitats and localities. The Ethiopian fauna of *Laelaps* mites includes 31 species, 4 of which are described as new: *L. parasimillimus, L. myomys, L. malacomys,* and *L. acomys*. A numerical taxonomic analysis was made, the results of which were used in the preparation of a proposed classification of the African species of *Laelaps*. A key for identification of females is given, and females and males (where known) of all species are illustrated. Diagnostic characters are given for the female and male of each species. Collection data and, where pertinent, discussions of morphological characters and variability are provided. Also included are discussions of host-parasite associations.

The objective of this paper is to present a systematic revision of the genus *Laelaps* s. str. (i.e., not including species of *Echinolaelaps* Ewing) of the Ethiopian region. There has been no recent publication which presents a sufficiently comprehensive taxonomic review of this group of mites in Africa. Because of the great similarity as well as diversity among the *Laelaps* species in Africa, there has been a definite need for a complete, comprehensive revision of this group of mites. This need is increased by the great diversity of *Laelaps* taxa found in the collections from the Smithsonian African Ectoparasite Project.

Several scientists have contributed greatly to the knowledge of parasitic *Laelaps* mites of the Ethiopian region. Stanley Hirst (1912 to 1925) described as new seven species of African *Laelaps*, which were included in Bedford's (1932, 1936) checklists of ectoparasites of Ethiopian vertebrates. During the years between 1937 and 1954 Charles Radford published several papers dealing with new species and new host and collection records. In the 1950s and 1960s additional contributions were made by Drs. F. Zumpt, R. Taufflieb, H. L. Keegan, and M. Lavoipierre. They were responsible for the description of 21 *Laelaps* species and the publication of many new host and locality records. Tipton (1960) treated the genus *Laelaps* worldwide; however, 11 of the 32 species now known from Africa were described after this work. In his book Arthropod Parasites of Vertebrates in Africa South of the Sahara, Zumpt (1961) listed 22 species. The only keys to the identification of African species of the genus were those of Tipton (1960) and Taufflieb (1959).

The concept of the genus *Laelaps* followed in this paper is basically that of Tipton (1960). That is, we do not feel that *Laelaps* and *Echinolaelaps* should be grouped together without at least separate subgeneric status for each. Thus, this paper deals only with *Laelaps* s. str. (subgenus *Laelaps*) as recognized by Tipton (1960) and does not include *Echinolaelaps*. The dorsal chaetotaxy signatures followed in this paper are those of Hirschmann (1957), and the morphological terminology is basically that of Evans and Till (1965).

Following the discussion of taxonomy and classification analyses and the identification key to females, each species is

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treated as follows: synonymy, brief description of female and male (where known), summary of all collection records (literature as well as collections of the African Mammal Project), and brief discussion of differential diagnostic characters and host-parasite relationships. For the species described herein as new, the collection records are presented in more detail.

For each species described as new to science, the holotype, allotype (where described), and one or more paratypes are to be deposited in the U.S. National Museum of Natural History, Washington, D. C. Paratypes are to be deposited in the collection of the South African Institute for Medical Research, Johannesburg, South Africa, and in the collections of the authors.

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Materials and Methods

Materials Utilized

Type specimens of most of the previously described *Laelaps* species of Africa were obtained from various museums and individuals for examination and use in the numerical taxonomic analyses. Where type specimens were not available, positively identified representative specimens from the type locality were obtained for each species. Also, representative specimens of the various taxa found in the collections of the Smithsonian-African Ectoparasite Project were included in the numerical taxonomic studies. The specimens (OTUs) included in the numerical taxonomic analyses are listed in Table 1. The following source abbreviations are used in Table 1 and elsewhere in the paper: SAIMR = South African Institute for Medical Research; AMP = African Mammal Project; USNM = United States National Museum of Natural History, Smithsonian Institution; BMNH = British Museum (Natural History); Taufflieb = Roger Taufflieb, Dakar, Senegal.

A list of 159 characters was compiled for use in this study (Tables 2 and 3); of these, 33 were qualitative and 126 were quantitative (measurements). Each specimen selected for inclusion in the analyses was examined and the value of each character recorded on data forms. The data were entered on computer punch cards preparatory to the computer analyses.

Computational and Analytical Methods

The computer analyses were performed on the IBM 360 model 65 computer at the Brigham Young University Computer Center using the Numerical Taxonomy System of Multivariate Statistical Programs (NT-SYS) prepared by Dr. F. James Rohlf and associates of the State University of New York at Stony Brook. The specific procedures used in the analyses were as follows: (1) transformation of the basic data matrix by standardization (Sokal 1961); (2) computation of Pearson's product-moment correlation (Michener and Sokal 1957) and Sokal's (1961) taxonomic distance to produce similarity matrices; (3) analysis of each similarity matrix by the UPGMA cluster analysis, yielding a phenogram (a graphic presentation of phenetic resemblance for each matrix; and (4) cophenetic correlations were computed to arrive at an estimate of the degree of information transferred from the similarity matrices to the phenograms. The purpose of these numerical taxonomic analyses was to objectively evaluate the affinity or similarity between the taxonomic units. The results of these analyses were then used in making decisions regarding the validity of all previously described *Laelaps* species as well as new taxa included in the analyses. The final proposed classification is based primarily on this phase of the investigation.

Results and Discussion

Taxonomic Analyses

Prior to the numerical taxonomic analyses, a proposed classification of the genus

TABLE 1. *Laelaps* specimens included in the numerical taxonomic analyses.

Species	Type	Host	Locality	Source
L. transvaalensis	Paratype	*Otomys irroratus*	Transvaal, So. Africa	SAIMR
L. keegani		*Arvicanthis niloticus*	Northern Nigeria	SAIMR
L. congoicola	Paratype	*Ocnomys hypoxanthus*	Brazzaville, Congo	Taufflieb
L. parasimillimus n. sp.	Holotype	*Dephomys defua*	Soubre, Ivory Coast	AMP
L. simillimus	Paratype	*Thallomys namaquensis*	Transvaal, So. Africa	SAIMR
L. grenieri	Paratype	*Lemniscomys striatus*	Brazzaville, Congo	Taufflieb
L. thamnomys	Paratype	*Thamnomys rutilans*	Brazzaville, Congo	Taufflieb
L. kampalensis	Paratype	*Lemniscomys striatus*	Kampala, Uganda	SAIMR
L. moucheti	Paratype	"rodents"	Yaounde, Cameroons	Taufflieb
L. lavieri	Paratype	*Mus bella*	Brazzaville, Congo	Taufflieb
L. nigeriensis	Holotype	*Crocidura* sp.	Adu, Nigeria	USNM
L. fritzumpti	Paratype	*Rattus paedulcus*	Kalahara, So. Africa	Taufflieb
L. lavoipierrei	Paratype	*Lophuromys sikapusi*	Yaounde, Cameroons	Taufflieb
L. tillae	Paratype	*Lemniscomys griselda*	Transvaal, So. Africa	Taufflieb
L. roubaudi	Paratype	*Dasymys incomptus*	Brazzaville, Congo	Taufflieb
L. peregrinus	Paratype	*Rhabdomys pumilio*	Transvaal, So. Africa	Taufflieb
L. peregrinus		*Rhabdomys pumilio*	(ORS) So. Africa	AMP
L. nuttalli	Syntype	*Mus norvegicus*	Sierra Leone	BMNH
L. malacomys n. sp.	Holotype	*Malacomys edwardsi*	Belekoam, Ivory Coast	AMP
L. algericus	Syntype	*Mus algericus*	Tougoury, Algeria	BMNH
L. oraniensis	Syntype	"field mice"	Oran, Algeria	BMNH
L. brandbergensis	Paratype	*Petromyscus collinus*	Brandberg, SW Africa	SAIMR
L. zumpti	Holotype	*Mus triton*	Njoro, Kenya	USNM
L. myomys n. sp.	Holotype	*Myomys daltoni*	Casa Manee, Senegal	AMP
L. liberiensis	Holotype	*Epimys defua*	Liberia	BMNH
L. lamborni	Syntype	"Kapuku"	Karonga, Nyasaland	BMNH
L. setzeri	Paratype	*Praomys jacksoni*	Ora, Western Nigeria	SAIMR
L. brazzai	Paratype	*Praomys* sp.	Brazzaville, Congo	Taufflieb
L. benoiti	Paratype	*Mus bella*	Brazzaville, Congo	Taufflieb
L. aethiopicus	Syntype	"rats"	Wanga, Kenya	BMNH
L. vansomereni	Syntype	"rodent"	So. Bugishu, Uganda	BMNH
L. acomys n. sp.	Holotype	*Acomys spinosissineus*	Manicaland, Rhodesia	AMP
L. bocquieri	Paratype	*Chryssochloris leucorrhina*	Brazzaville, Congo	SAIMR
L. spinifer		*Hybomys* sp.	Congo	Taufflieb
L. paraspinosus	Syntype	*Arvicanthis dorsalis*	So. Africa	BMNH
L. breviperitremus	Paratype	*Acomys subspinosus*	Transvaal, So. Africa	USNM
L. kochi		*Arvicola terrestris*	Teheran Prov., Iran	AMP

TABLE 2. Quantitative characters (measurements) of females used in the numerical taxonomic analyses.

Gnathosoma

1. Greatest width at level of gnathosomal setae
2. Length from base to palpal trochanter
3. Length of palps
4. Length 2nd cheliceral segment
5. Length chelae
6. Length distal hypostomal setae
7. Length medial hypostomal setae
8. Length lateral hypostomal setae
9. Length gnathosomal setae
10. Distance between gnathosomal setae
11. Distance medial hypostomal setae to gnathosomal setae

Venter

12. Width sternal plate at level of coxae II
13. Median length sternal plate
14. Distance between setae st. 1
15. Distance between setae st. 2
16. Distance between setae st. 3
17. Distance between setae st. 1 and st. 2
18. Distance between setae st. 2 and st. 3
19. Length setae st. 1
20. Length setae st. 2
21. Length setae st. 3
22. Length setae st. 4 (metasternal)
23. Least width genital plate between coxae IV
24. Greatest width genital plate
25. Total length genital plate
26. Length genital plate from 1st genital setae to posterior end
27. Distance between 1st pair genital setae
28. Distance between 2nd pair genital setae
29. Distance between 3rd pair genital setae
30. Distance between 4th pair genital setae
31. Length 1st pair genital setae
32. Length 2nd pair genital setae
33. Length 3rd pair genital setae
34. Length 4th pair genital setae
35. Distance between genital plate and anal plate
36. Greatest width anal plate
37. Length anal plate from anterior margin to postanal seta
38. Distance between adanal setae
39. Distance from anterior margin anal plate to adanal setae
40. Distance from adanal setae to postanal seta
41. Length adanal setae
42. Length postanal seta
43. Length short setae of unarmed venter
44. Length longer setae of unarmed venter
45. Length metapodal plates
46. Width metapodal plates

Legs
47. Greatest width coxa I
48. Midventral length coxa I
49. Length proximal seta coxa I
50. Length distal seta coxa I
51. Length anterior dorsal seta 1 of femur I
52. Length posterior dorsal seta 1 of femur I
53. Width genu I
54. Length tarsus I
55. Greatest width coxa II
56. Midventral length coxa II
57. Length anterior seta coxa II
58. Length posterior seta coxa II
59. Length tibia II
60. Width tibia II
61. Length tarsus II
62. Greatest width coxa III
63. Median length coxa III
64. Length anterior seta coxa III
65. Length posterior seta coxa III
66. Length genu III
67. Width genu III
68. Length tibia III
69. Length tarsus III
70. Greatest width coxa IV
71. Median length coxa IV
72. Length seta coxa IV
73. Length trochanter IV
74. Width trochanter IV
75. Length femur IV
76. Length genu IV
77. Width genu IV
78. Length tibia IV
79. Length tarsus IV

Dorsum
80. Length of peritreme
81. Median length of dorsal plate
82. Greatest width of dorsal plate
83. Distance between setae r1
84. Distance between setae s1
85. Distance between setae r2
86. Distance between setae r5
87. Distance between setae i3
88. Distance between setae z1
89. Distance between setae i4
90. Distance between setae z2
91. Distance between setae i5
92. Distance between setae s6
93. Distance between setae S1
94. Distance between setae J2
95. Distance between setae J3
96. Distance between setae J4
97. Distance between setae Z4
98. Distance between setae S4
99. Distance between setae J5
100. Distance between setae Z5
101. Distance between setae s1 and i4
102. Distance between setae i4 and i5
103. Distance between setae z1 and z3
104. Distance between setae i5 and J3
105. Distance between setae J4 and Z5
106. Distance between setae J5 and posterior end of dorsal plate
107. Length of seta i1
108. Length of seta r1
109. Length of seta s1
110. Length of seta i2
111. Length of seta s2
112. Length of seta r2
113. Length of seta r3
114. Length of seta r4
115. Length of seta s5
116. Length of seta i4
117. Length of seta J1
118. Length of seta Z1
119. Length of seta J3
120. Length of seta J4
121. Length of seta Z3
122. Length of seta Z4
123. Length of seta S4
124. Length of seta S5
125. Length of seta J5
126. Length of seta Z5

TABLE 3. Qualitative characters of females used in the numerical taxonomic analyses and in the construction of the identification key.

Gnathosoma
1. Form of gnathosomal setae:
   (1) Setaceous
   (2) Spinelike
   (3) Peglike
2. Form of hypostomal setae 2 (lateral):
   (1) Setaceous
   (2) Spinelike
   (3) Peglike

Venter
3. Shape of posterior margin of sternal plate:
   (1) Convex, more or less
   (2) Straight, irregularly
   (3) Slightly invaginated
   (4) Moderately invaginated, to setae st. 3
   (5) Deeply invaginated, to beyond st. 3
   (6) Extremely invaginated, to 2nd pair pores
4. Sternal plate length/width ratio (expressed in decimal fraction)
5. Form of sternal setae:
   (1) Setaceous
   (2) Spinelike
6. Genital plate length/width ratio (expressed in decimal fraction)
7. Place of greatest width of genital plate:
   (1) Level of genital setae
   (2) Level of 2nd genital setae (Zv1)
   (3) Level of 3rd genital setae (Jv1)
8. Relative distance between 1st versus 4th pairs of setae on genital plate:
   (1) 1st less than 4th
   (2) 1st equal to 4th
   (3) 1st greater than 4th
9. Shape of posterior margin of genital plate between 4th pair setae:
   (1) Convex, rounded
   (2) Straight
   (3) Concave, invaginated
10. Number of setae on unarmed venter
11. Relative distance between genital and anal plates:
   (1) Great distance
   (2) Moderate distance
   (3) Close, almost touching
12. Shape of metapodal plates:
   (1) Narrow elongate, much longer than wide
   (2) Broadly oval, moderately longer than wide
   (3) Rounded or oval, length equal to width
13. Length/width ratio of anal plate (expressed in decimal fraction)
14. Shape of anterior margin of anal plate:
   (1) Convex, rounded
   (2) Straight
   (3) Concave, invaginated

15. Position of adanal setae relative to anal orifice:
    (1) Posterior to anal orifice
    (2) Slightly posterior to middle of anal orifice
    (3) At level of middle of anal orifice
    (4) Slightly anterior to middle of anal orifice
    (5) Anterior to anal orifice
16. Form of adanal setae:
    (1) Setaceous and slender
    (2) Spinelike and stout
17. Anterior extension of peritreme:
    (1) Anterior of coxa I
    (2) Middle of coxa I
    (3) Posterior of coxa I
    (4) Anterior of coxa II
    (5) Middle of coxa II
18. Chitinization of anterolateral margins of dorsal plate:
    (1) Normal chitinization
    (2) Heavily chitinized
19. Number of setae on dorsal plate
20. General form of central and anterior dorsal setae:
    (1) Setaceous
    (2) Spinelike, stout and short

Legs

21. Form of distal seta of coxa I:
    (1) Setaceous
    (2) Spinelike
    (3) Peglike
22. Form of proximal seta of coxa I:
    (1) Setaceous
    (2) Spinelike
    (3) Peglike
23. Form of proximal ventral seta of trochanter I:
    (1) Setaceous
    (2) Spinelike
24. Relative length of pd 1 seta of femur I:
    (1) Subequal to ad 1 seta
    (2) About 1.5 times length of ad 1 seta
    (3) Two times or more length of ad 1 seta
25. Form of anterior seta of coxa II:
    (1) Setaceous
    (2) Spinelike
    (3) Peglike
26. Form of posterior seta of coxa II:
    (1) Setaceous
    (2) Spinelike (acute)
    (3) Peglike (blunt)
27. Form of ventral proximal seta of trochanter II:
    (1) All setaceous
    (2) One spinelike
    (3) Two spinelike
28. Form of preapical setae of tarsus II:
    (0) All setaceous
    (1) One spinelike
    (2) One peglike
    (3) Two spinelike
    (4) Two peglike
    (5) One spinelike and one peglike
    (6) Three spinelike
    (7) Three peglike
    (8) Two spinelike and one peglike
    (9) One spinelike and two peglike
    (10) Four peglike
29. Form of anterior seta of coxa III:
    (1) Setaceous
    (2) Spinelike
    (3) Peglike
30. Form of posterior seta of coxa III:
    (1) Setaceous
    (2) Spinelike
    (3) Peglike
31. Form of preapical setae on tarsus III:
    (0) All setaceous
    (1) One spinelike
    (2) One peglike
    (3) Two spinelike
    (4) Two peglike
32. Form of ventral seta of coxa IV:
    (1) Setaceous
    (2) Spinelike
    (3) Peglike
33. Form of preapical setae on tarsus IV:
    (0) All setaceous
    (1) One spinelike
    (2) One peglike
    (3) Two spinelike
    (4) Two peglike
    (5) One spinelike and one peglike
    (6) Three spinelike
    (7) Three peglike
    (8) Two spinelike and one peglike
    (9) One spinelike and two peglike

Laelaps s. str. was prepared based upon classical taxonomic methods (i.e., consideration of unequal weight given to a smaller number of key characters). This proposed classification, as presented in Table 4, defines three major groups (*simillimus* group, *nuttalli* group, and *vansomereni* group) based primarily upon the form of the proximal and distal setae of coxa I. The arrangement of taxa within the three groups is based on subjective judgments after having examined representative specimens of all taxa. No subgroups were defined in this arrangement.

Figure 1 summarizes the taxonomic relationships given by the UPGMA cluster anaylsis of a standardized correlation coefficient matrix based upon an original data matrix of 37 OTUs and 159 characters. The cophenetic correlation coefficient for this phenogram (Fig. 1) was 0.669, which is not too high, yet higher than that for the phenogram of the taxonomic distance matrix. A phenon line drawn vertically across the phenogram at the 0.09 level defines eight clusters denoted as A-H. It should be noted here that the primary interest in the phenogram is in the grouping of taxa rather than the relative levels at which taxa and clusters link with each other. Also, it should be kept in mind that the vertical ordering of taxa and clusters is not significant, i.e., each cluster may be rotated on its horizontal axis by 180 degrees without altering any relationships.

Generally, the correlation between the

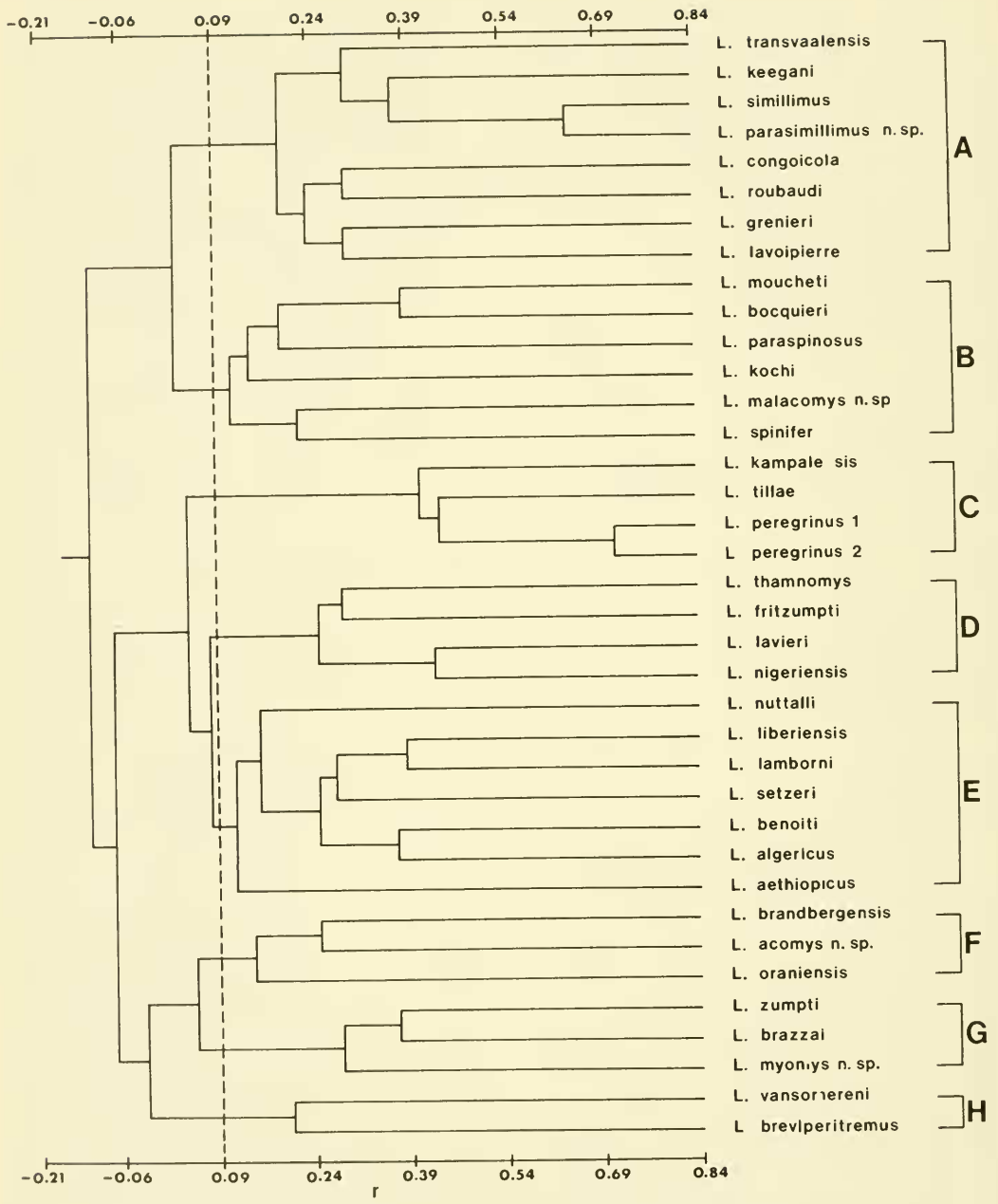


Fig. 1. Phenogram obtained from UPGMA cluster analysis of standardized correlation matrix based on 159 characters by 37 OTU data matrix.

two classification arrangements is quite good, especially in the similarity between taxa. The first six taxa (*L. transvaalensis*, *L. keegani*, *L. congoicola*, *L. parasimillimus* n. sp., *L. simillimus*, and *L. grenieri*) of the *a priori* defined *simillimus* group formed the first cluster (A) of the phenogram, but with two taxa (*L. lavoipierrei* and *L. roubaudi*) of the *nuttalli* group included also. Of the eight taxa in cluster A, *L. simillimus* and *L. parasimillimus* are the most similar. Based on the numerical taxonomic analysis (phenogram) alone, one might be tempted to synonymize these

TABLE 4. Preliminary proposed classification of the genus *Laelaps* s. str. based on classical taxonomic methods prior to the numerical taxonomic analysis.

simillimus group
- *L. transvaalensis* Zumpt, 1950
- *L. keegani* Thurman, 1958 (= *L. berlesi* Keegan, 1956)
- *L. congoicola* Taufflieb, 1959
- *L. parasimillimus* n. sp.
- *L. simillimus* Zumpt, 1950
- *L. grenieri* Taufflieb, 1954
- *L. thamnomys* Taufflieb, 1954
- *L. kampalensis* Taufflieb, 1959
- *L. moucheti* Taufflieb, 1959
- *L. lavieri* Taufflieb, 1954 (= *L. nigeriensis* Keegan, 1962)
- *L. fritzumpti* Taufflieb, 1964

nuttalli group
- *L. lavoipierrei* Taufflieb, 1954
- *L. tillae* Taufflieb, 1959
- *L. roubaudi* Taufflieb, 1954
- *L. peregrinus* Taufflieb, 1959
- *L. nuttalli* Hirst, 1915
- *L. malacomys* n. sp.
- *L. brandbergensis* Taufflieb, 1959
- *L. zumpti* Keegan, 1956
- *L. myomys* n. sp.
- *L. liberiensis* Hirst, 1925 (= *L. lamborni* Hirst, 1925)
- *L. setzeri* Coffey, 1971
- *L. brazzai* Taufflieb, 1962
- *L. benoiti* Taufflieb, 1964

vansomereni group
- *L. aethiopicus* Hirst, 1925
- *L. vansomereni* Hirst, 1923
- *L. acomys* n. sp.
- *L. bocquieri* Taufflieb, 1962
- *L. spinifer* Taufflieb. & Mouchet, 1956
- *L. paraspinosus* Tipton, 1960 (= *L. parvulus* Hirst, 1923)
- *L. breviperitremus* (Garrett & Strandtmann, 1967)

two taxa, but there are several quite distinctive morphological key characters separating them (see identification key). The placement of *L. lavoipierrei* and *L. roubaudi* in cluster A of the phenogram is based on overall phenetic resemblance (i.e., 159 characters weighted equally) rather than consideration of several key characters as in the classical taxonomic arrangement. In the phenogram *L. moucheti* is included in cluster B, which includes taxa of the *a priori vansomereni* group. In examining the basic data matrix, it appears that *L. moucheti* and *L. bocquieri* are phenetically similar in characters related to length of setae, especially dorsal body setae. This was supported by an additional numerical taxonomic analysis in which the number of characters was reduced to 105, eliminating highly correlated characters, especially those related to length of setae. In the resulting phenogram *L. moucheti* was included in cluster A and most similar to *L. transvaalensis*. *L. malacomys* n. sp., which was originally placed in the *nuttalli* group, is included in cluster B of the phenogram with *L. spinifer*, most likely because of the many peglike and spinelike leg and body setae, characteristics which are more typical of taxa of the *vansomereni* group. It should be noted that *L. kochi* of cluster B and *L. algericus* and *L. oraniensis* of clusters E and F were included in the numerical taxonomic analysis, even though they are not indigenous to the Ethiopian region, because of their similarity to taxa from this region and because their distribution includes northern Africa (Palearctic region), which borders the Ethiopian region on the north.

The four remaining taxa of the *a priori* defined *simillimus* group (*L. thamnomys*, *L. kampalensis*, *L. lavieri*, and *L. fritzumpti*) were divided between two closely related phenogram clusters (C and D). *L. kampalensis* appears in cluster C with *L. tillae* and *L. peregrinus*, two taxa of the *nuttalli* group. Cluster D consists of the remaining three taxa, *L. thamnomys*, *L. fritzumpti*, and *L. lavieri*. Prior to the numerical taxonomic analysis, *L. lavieri* and *L. nigeriensis* were determined to be synonyms, and this seems to be confirmed by their placement in the phenogram.

Cluster E contains six taxa of the *a priori* defined *nuttalli* group plus *L. aethiopicus* of the vansomereni group. Prior to the numerical taxonomic analysis, *L. liberiensis* and *L. lamborni* were determined to be synonymous, and this seems to be confirmed by their placement in the phenogram. The close phenetic relationship between *L. liberiensis*, *L. setzeri*, *L. benoiti*, and *L. algericus* was confirmed by the numerical taxonomic analysis. The low level at which *L. aethiopicus* joins cluster E poses some question on its actual phenetic resemblance with the *nuttalli* group.

Clusters F and G consist of all remaining taxa of the previously defined *nuttalli* group plus *L. acomys* n. sp., which was originally placed with the *vansomereni* group. These two clusters join together before either joins with any other cluster, thus confirming the phenetic relationship among the five taxa involved. The final cluster (H) consists of *L. vansomereni* and *L. breviperitremus*. In the previously

noted numerical taxonomic analysis based on 105 characters, *L. vansomereni* joined *L. aethiopicus* prior to their inclusion in a particular cluster, thus giving some validity to the *a priori* defined close phenetic relationship between these two taxa.

Systematics of the Genus *Laelaps* s. str.

After critical study of the numerical taxonomic analyses and close examination of as many specimens of each taxa as were available, a final proposed classification of the genus *Laelaps* s. str. was prepared (Table 5). The taxonomic groupings in this proposed classification are based primarily on overall phenetic resemblance as determined by both classical and numerical taxonomic evaluations. We found no set of key characters which may be used to completely and definitively separate all these groups, especially the subgroups. The 31 taxa described in this paper are treated in the same order as listed in Table 5. The following identification key reflects to some degree the phenetic relationships between most taxa as presented in the proposed classification; however, it should be kept in mind that the key is based on sets of diagnostic qualitative characters, whereas the proposed classification is based more on overall phenetic resemblance.

The taxa of the three major groups (I, II and III) of the proposed classification are separated primarily on the form of the proximal and distal setae of coxa I. The taxa of major group I, except for *L. lavoipierrei*, may be distinguished by both coxa I setae being setaceous. The distal seta of coxa I of *L. lavoipierrei* is very small but blunt and peglike. The taxa of major group II may be basically distinguished by the blunt, peglike distal seta and setaceous proximal seta of coxa I, with but two exceptions: *L. kampalensis* bears a setaceous seta both proximally and distally on coxa I, and *L. aethiopicus* bears a blunt, peglike seta both proximally and distally on coxa I. Major group III contains taxa bearing a blunt, peglike seta both proximally and distally on coxa I.

Table 5. Final proposed classification of the genus *Laelaps* s. str.

Major group I
- Subgroup A
  - *L. simillimus* Zumpt, 1950
  - *L. parasimillimus* n. sp.
  - *L. keegani* Thurman, 1958
  - *L. transvaalensis* Zumpt, 1950
  - *L. congoicola* Taufflieb, 1959
  - *L. lavoipierrei* Taufflieb, 1954
  - *L. grenieri* Taufflieb, 1954
- Subgroup B
  - *L. lavieri* Taufflieb, 1954
  - *L. fritzumpti* Taufflieb, 1964
  - *L. thamnomys* Taufflieb, 1954
  - *L. moucheti* Taufflieb, 1959

Major group II
- Subgroup A
  - *L. kampalensis* Taufflieb, 1959
  - *L. tillae* Taufflieb, 1959
  - *L. peregrinus* Taufflieb, 1959
  - *L. roubaudi* Taufflieb, 1954
- Subgroup B
  - *L. nuttalli* Hirst, 1915
  - *L. aethiopicus* Hirst, 1925
  - *L. liberiensis* Hirst, 1925
  - *L. setzeri* Coffey, 1971
  - *L. benoiti* Taufflieb, 1964
- Subgroup C
  - *L. brandbergensis* Taufflieb, 1959
  - *L. zumpti* Keegan, 1956
  - *L. brazzai* Taufflieb, 1962
  - *L. myomys* n. sp.
  - *L. malacomys* n. sp.

Major group III
- Subgroup A
  - *L. vansomereni* Hirst, 1923
  - *L. acomys* n. sp.
- Subgroup B
  - *L. spinifer* Taufflieb and Mouchet, 1956
  - *L. paraspinosus* Tipton, 1960
  - *L. bocquieri* Taufflieb, 1962
  - *L. breviperitremus* (Garrett and Strandtmann, 1967)

Key to Species of *Laelaps* from Small Mammals of Africa

(Females)

1. Distal seta of coxa I setaceous 2
   Distal seta of coxa I spinelike or peglike 12

2(1). Tarsi II and III with all preapical setae setaceous or at most with one spinelike 3
   At least one blunt, peglike preapical seta on tarsi II and III 10

3(2). Smaller species, dorsal plate less than 575 μ long 4
   Larger species, dorsal plate greater than 575 μ long 9

4(3). Anal plate distinctly longer than wide; adanal setae short, length no greater than length of anal orifice; proximal seta of coxa I long, almost twice as long as distal seta (Figs. 14-17) ..... *L. transvaalensis* Zumpt

Anal plate as wide as or wider than long; adanal setae distinctly longer than length of anal orifice; proximal seta of coxa I not unusually long 5

5(4). Posterior seta of coxa II long, setaceous or spinelike, never blunt and peglike; posterior seta of coxa III short and spinelike (Figs. 8-11) ..... *L. keegani* Thurman

Posterior seta of coxae II and III always blunt and peglike 6

6(5). Posterior margin of sternal plate moderately invaginated, at least to level of setae st. 3; first sternal setae long, extending distinctly beyond posterior margin of sternal plate (Figs. 20-21) ..... *L. congoicola* Taufflieb

Posterior margin of sternal plate only slightly, if at all, invaginated; first sternal setae shorter, not extending near to posterior margin of sternal plate 7

7(6). Adanal setae rather short, not extending to base of postanal setae; unarmed venter bearing more than 10 pairs of rather short setae adjacent to genital and anal plates (Figs. 6-7) ..... *L. parasimillimus* n. sp.

Adanal setae longer, extending to or beyond base of postanal seta; unarmed venter bearing less than 10 pairs of medium-length setae adjacent to genital and anal plates 8

8(7). Metapodal plates rather narrow elongate; distance between 2nd genital setae distinctly less than distance between 3rd; sternal plate length/width ratio less than .75 (Figs. 2-3) ..... *L. simillimus* Zumpt

Metapodal plates irregularly oval, not so narrow and elongate; distance between 2nd genital setae greater than or equal to distance between 3rd; sternal plate length/width ratio greater than .75 (Figs. 28-29) ..... *L. grenieri* Taufflieb

9(3). Posterior margin of sternal plate only slightly invaginated medially; greatest width of genital plate at level of 3rd genital setae; distance between 1st genital setae equal to or less than distance between 4th genital setae (Figs. 43-44) ..... *L. thamnomys* Taufflieb

Posterior margin of sternal plate moderately invaginated, to or slightly beyond level of 3rd sternal setae; greatest width of genital plate at level of 2nd genital setae; distance between 1st genital setae distinctly greater than distance between 4th genital setae (Figs. 54-55) ..... *L. kampalensis* Taufflieb

10(2). Dorsal plate with 38 pairs of rather small setae, especially more centrally located setae, setae px3 absent; anterior margin of anal plate rounded; medial hypostomal setae short, extending no further than half distance to gnathosomal setae (Figs. 47-51) .... *L. moucheti* Taufflieb

Dorsal plate with usual 39 pairs of rather long setae; anterior margin of anal plate straight or slightly concave; medial hypostomal setae longer, extending distinctly further than half distance to gnathosomal setae 11

11(10). Peritreme longer, extending anteriorly to middle or posterior of coxa I; tarsi II and III each bear one blunt, peglike preapical setae, and tarsus IV with no blunt preapical setae (Figs. 30-33) .. *L. lavieri* Taufflieb

Peritreme short, extending only to level of middle of coxa II; tarsi II, III, and IV each bear two or more blunt, peglike preapical setae (Figs. 36-40) ..... *L. fritzumpti* Taufflieb

12(1). Proximal seta of coxa I setaceous and elongate 13
Proximal seta of coxa I robust, short, and spinelike or peglike 25

13(12). Tarsi II, III, and IV with preapical setae setaceous or at most one spinelike 14
Tarsi II, III, and IV with one or more blunt, peglike preapical setae 17

14(13). Distal seta of coxa I small, slender yet blunt and peglike; proximal seta of coxa I slender, setaceous; posterior margin of sternal plate only slightly invaginated, no further than level of 3rd sternal setae 15
Distal seta of coxa I large, robust, blunt, and peglike; proximal seta of coxa I long and somewhat enlarged, almost elongate spinelike; posterior margin of sternal plate moderately invaginated, distinctly beyond level of 3rd sternal setae 16

15(14). Distance between 1st genital setae distinctly less than distance between 4th, and distance between 2nd distinctly less than distance between 3rd; distal seta of coxa I very small, blunt, and peglike (Figs. 24-25) ..... *L. lavoipierrei* Tauffliеb
Distance between 1st genital setae distinctly greater than distance between 4th, and distance between 2nd greater than distance between 3rd; distal seta of coxa I not small (Figs. 56-57) ..... *L. tillae* Tauffliеb

16(14). Distance between 2nd genital setae subequal to distance between 3rd; smaller species, dorsal plate length less than 600 μ; peritreme extends anteriorly to level of middle of coxa I (Figs. 62-63) ..... *L. roubaudi* Tauffliеb
Distance between 2nd genital setae distinctly greater than distance between 3rd; larger species, dorsal plate length greater than 600 μ; peritreme extends anteriorly to level of middle of coxa II (Figs. 60-61) ..... *L. peregrinus* Tauffliеb

17(13). Peritreme extends anteriorly to near middle of coxa I 18
Peritreme extends anteriorly to near middle of coxa II 19

18(17). Gnathosomal setae slender, medium length, and setaceous; all ventral setae of leg I slender, setaceous; adanal setae of moderate length (Figs. 66-70) ..... *L. nuttalli* Hirst
Gnathosomal setae long, robust, and almost spinelike; some ventral setae of leg I short, robust, and spinelike or peglike; adanal setae short (Figs. 119-123) ..... *L. myomys* n. sp.

19(17) Seta pd 1 of femur I unusually long, nearly two times as long as ad 1 seta; greatest width of genital plate at level of 2nd genital setae; distance between 1st genital setae usually greater than distance between 4th (Figs. 98-102) ..... *L. brandbergensis* Tauffliеb
Seta pd 1 of femur I not unusually long, no more than 1.5 times as long as ad 1 seta; greatest width of genital plate at level of 3rd genital setae; distance between 1st genital setae equal to or less than distance between 4th 20

20(19). Adanal setae short, not reaching to base of postanal seta; posterior margin of sternal plate moderately invaginated, to or beyond level of 3rd sternal setae; distance between 2nd genital setae equal to distance between 3rd (Figs. 105-109) ..... *L. zumpti* Keegan
Adanal setae longer, extending to or beyond base of postanal seta; posterior margin of sternal plate only slightly invaginated or with moderate invagination medially between pair of posterior projections, not invaginated near to level of 3rd sternal setae; distance

between 2nd genital setae distinctly less than distance between 3rd 21

21(20). Posterior margin of sternal plate only slightly invaginated, with rather small pair of posterior projections, if at all 22
Posterior margin of sternal plate with slight to moderate invagination between pair of prominent posterior projections 24

22(21). Tarsus II with three blunt, peglike preapical setae; tarsus III with four to five blunt, peglike setae, two of which are preapical; distal seta of coxa I more robust and enlarged; metapodal plates more elongate; smaller species (Figs. 126-130) ..... *L. malacomys* n. sp.
Tarsus II with only two blunt, peglike preapical setae; tarsus III with two to three blunt, peglike setae, one of which is preapical; distal seta of coxa I not so enlarged; metapodal plates more oval or triangular; larger species 23

23(22). All dorsal setae long to medium in length, setae J5 extending to or beyond posterior margin of dorsal plate (Figs. 77-81) ..... *L. liberiensis* Hirst
Anterior and all marginal setae long to medium in length, but posterocentral setae rather small, setae J5 short, not reaching even to level of setae Z5 (Figs. 84-88) ..... *L. setzeri* Coffey

24(21). Sternal plate distinctly wider than long, posterocentral dorsal setae shorter, setae J4 not reaching near to level of J5, and J5 extending no further than posterior margin of plate (Figs. 112-116) ..... *L. brazzai* Taufflieb
Sternal plate approximately as long as wide; all dorsal setae rather long, setae J4 extending almost to level of setae J5, and J5 extending beyond posterior margin of plate (Figs. 91-95) .. *L. benoiti* Taufflieb

25(12). Gnathosomal setae setaceous, never robust and spinelike or peglike 26
Gnathosomal setae robust, spinelike or peglike 28

26(25). First sternal setae long, extending beyond posterior margin of sternal plate, well beyond level of setae st. 3; seta pd 1 of femur I shorter than sternal setae; adanal setae slender, setaceous (Figs. 73-76) ..... *L. aethiopicus* Hirst
First sternal setae shorter, not extending to posterior margin of sternal plate or near to level of setae st. 3; seta pd 1 of femur I as long as or longer than sternal setae; adanal setae rather robust and spinelike 27

27(26). Anterior margin of sternal plate only slightly arched, posterior margin only slightly invaginated; anal plate rounded, slightly wider than long (Figs. 133-137) ..... *L. vansomereni* Hirst
Anterior margin of sternal plate strongly arched, posterior margin deeply invaginated; anal plate elongate, distinctly longer than wide (Figs. 140-143) ..... *L. acomys* n. sp.

28(25). Lateral hypostomal setae robust, slightly recurved, and peglike; anterior seta of coxae II and III robust, spinelike or peglike; peritreme extends to anterior of coxa I; dorsal plate with only 31 pairs of mostly minute setae (Figs. 157-161) ..... *L. bocquieri* Taufflieb
Lateral hypostomal setae setaceous; anterior seta of coxae II and III setaceous; peritreme extends no further than anterior of coxa II; dorsal plate with at least 37 pairs of medium to large setae 29

29(28). Anal plate broadly triangular, considerably wider than long; adanal setae slender, setaceous; posterior margin of sternal plate irregular-

ly straight to very slightly invaginated; all setae of trochanters I and II setaceous; dorsal seta J5 very small (Figs. 146-149) ..... *L. spinifer* Taufflieb and Mouchet

Anal plate not unusually wide; adanal setae robust and spinelike or peglike; dorsal seta J5 longer, extending to or beyond posterior margin of dorsal plate 30

30(29). Dorsal plate with 37 pairs of setae, most medium length and setaceous, with posterior and lateral marginal setae long; all ventral plate setae rather long and setaceous; more than 50 setae on unarmed opisthosoma (Figs. 150-154) ..... *L. paraspinosus* Tipton

Dorsal plate with 39-40 pairs of setae, anterior two-thirds robust and spinelike, posterior one-third long and setaceous; sternal and first three genital setae short, robust, and spinelike; many less than 50 setae on unarmed opisthosoma (Figs. 164-165) ..... *L. breviperitremus* (Garrett and Strandtmann)

Major Group I

This major division of the genus is characterized by both proximal and distal setae of coxa I being setaceous, except for *L. lavoipierrei* in which the distal seta is very small and slender, yet blunt and peglike. This group is further divided into two subgroups based primarily on the form of the preapical setae of tarsus II.

Subgroup A

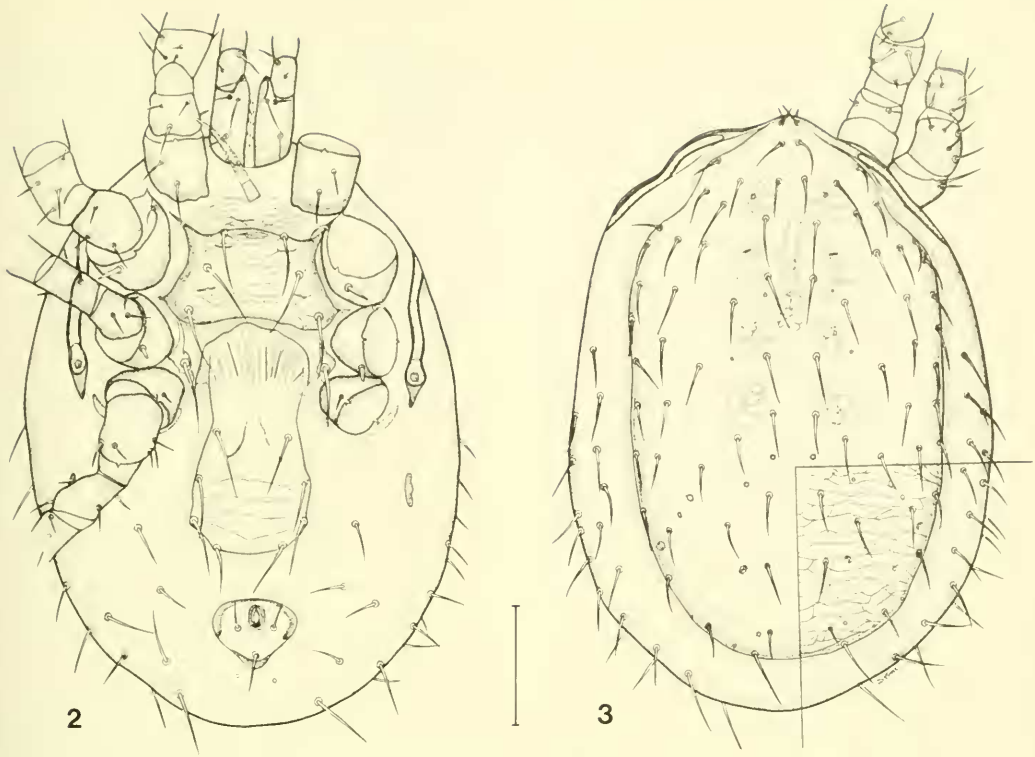
This subgroup consists of 7 taxa: *L. simillimus*, *L. parasimillimus*, *L. keegani*, *L. transvaalensis*, *L. congoicola*, *L. lavoipierrei*, and *L. grenieri*. All taxa of this subgroup are characterized by having the preapical setae of tarsus II setaceous or at most somewhat spinelike, but never blunt and peglike. These taxa clustered quite closely in the numerical taxonomic analysis.

Laelaps (*Laelaps*) *simillimus* Zumpt

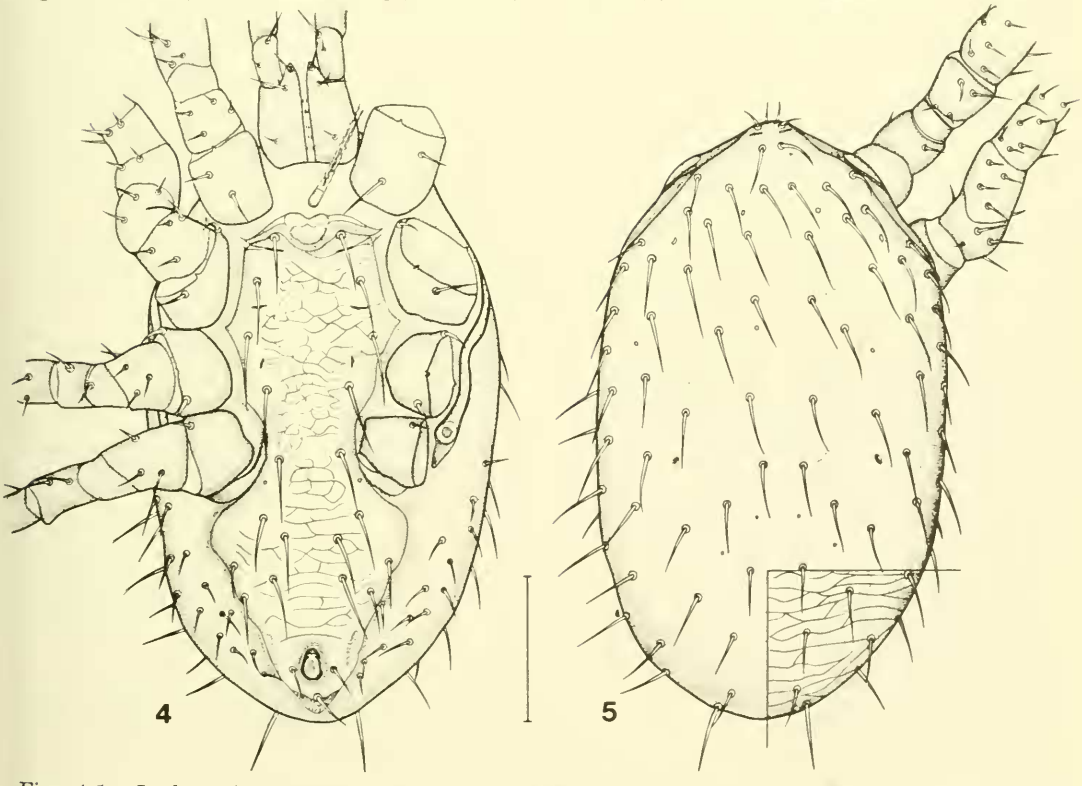
Figs. 2-5

Laelaps simillimus Zumpt, 1950, S. Afr. J. Med. Sci. 15:81 (Holotype: Johannesburg, Transvaal, South Africa; South African Institute for Medical Research., Johannesburg); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):282; Zumpt, 1961, Publ. S.Afr. Inst. Med. Res. 9(1):29.

Description.— *Female*: (Figs. 2-3) Dorsal plate length 456 μ, width 262 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching almost to or slightly beyond base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 of moderate length, reaching to level halfway between setae st. 2 and st. 3. Anterior flap of genital plate not overlapping posterior margin of sternal plate; distance between 1st genital setae slightly greater than distance between 4th genital setae, and distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate roundly triangular, as wide as or wider than long, with anterior margins rounded; adanal setae of moderate length, extending to or slightly beyond base of postanal seta; adanal setae set at level near posterior end of anal orifice. Unarmed venter bears approximately nine pairs of setaceous setae, four pairs adjacent to genital and anal plate plus approximately five pairs near or on posterior lateral body margins; metapodal plates rather elongate. Peritreme extends to level of middle of coxa I. Dorsal plate bears 39 pairs of setaceous setae; most dorsal setae of moderate length, length slightly less than distance between adjacent setae; subterminal setae (J5) reaching at least to level of base of setae Z5. Twelve to 16 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I relatively short and subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III moderately robust, blunt, and peglike; preapical setae of tarsi II and III mostly setaceous; however, one or two



Figs. 2-3. *Laelaps simillimus* Zumpt, female. (2) venter; (3) dorsum. scale = 100μ.



Figs. 4-5. *Laelaps simillimus* Zumpt, male. (4) venter; (5) dorsum. scale = 100μ.

setae may be spinelike; all other leg setae setaceous and normally developed.

Male: (Figs. 4-5) Gnathosomal and hypostomal setae setaceous, with medial hypostomal setae of moderate length but not reaching to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, of moderate length, each extending in length beyond base of seta immediately posterior; holoventral plate broad between coxae II and III, narrowing considerably between coxae IV and expanded considerably posterior to coxae IV; expanded area between genital setae and anal orifice bears five pairs of setaceous setae; adanal setae of moderate length extending slightly beyond base of postanal seta; adanal setae set slightly posterior to middle of anal orifice; postanal seta somewhat more robust and longer than adanal setae. Metapodal plates inapparent; unarmed venter bearing 12 to 14 pairs of setae adjacent to holoventral plate. Peritreme extends to level of middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae as in female. Both proximal and distal setae of coxa I setaceous, proximal seta about 1.5 times as long as distal seta; setae pd 1 and ad 1 of femur I relatively short with seta pd 1 somewhat longer than ad 1; anterior setae of coxae II and III, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa II rather long and setaceous, whereas posterior seta of coxa III spinelike; preapical setae of tarsi II and III mostly setaceous; however, one or two on each may be spinelike; all other leg setae setaceous and normally developed.

Collection records

Elephantulus intufi
South Africa; 1 coll. (1 female); AMP[3]
Macroscelides proboscideus
South Africa (ORS[4]); 1 coll. (1 female); AMP
Tadarida midas
South Africa; 2 coll. (2 females); AMP
Tatera afra
South Africa; Zumpt, 1961
Southwest Africa; Zumpt, 1961
Rhodesia; Zumpt, 1961
Tatera leucogaster
South Africa; 1 coll. (8 females); AMP
Aethomys chrysophilus
South Africa; Zumpt, 1961
Southwest Africa; Zumpt, 1961
Rhodesia; Zumpt, 1961
South Africa (Pretoria); Zumpt Collection (AMP)
South Africa; 27 coll. (64 females, 2 males); AMP
Botswana; 1 coll. (1 female); AMP
Rhodesia; 13 coll. (47 females, 1 male); AMP
Aethomys namaquensis
South Africa (Transvaal); 32 females, 2 males (type specimens); Zumpt, 1950
South Africa (Kamanjab); Tipton, 1960
Lemniscomys griselda
Rhodesia; 1 coll. (1 female); AMP
South Africa; 1 coll. (1 female); AMP
Lophuromys aquilus
Congo-Leopoldville; 7 females; Taufflieb, 1964
Angola (Dundo); 7 females; Taufflieb, 1962
Mastomys natalensis
South Africa; 1 coll. (1 female); AMP
South Africa (ORS); 15 coll. (21 females, 2 males, 3 ny); AMP
Rattus sp.
South Africa (Transvaal); 1 female; Taufflieb, 1964
Rhabdomys pumilio
South Africa; 3 coll. (5 females, 1 male, 1 ny); AMP
Unknown
Rhodesia; 1 coll. (1 female); AMP
South Africa; 15 coll. (19 females, 1 male); AMP

Remarks.— *L. simillimus* closely resembles most other taxa of subgroup A, differing in several distinguishing characters. It differs from *L. parasimillimus* in bearing only a few medium-length setae ventrally adjacent to the genital and anal plates, in the longer adanal setae, and in the genital plate which is somewhat more slender posteriorly. *L. simillimus* may be separated from *L. grenieri* by the narrower more elongate metapodal plates, the smaller length/width ratio of the sternal plate (less than .75), and by the distance between the 2nd genital setae being distinctly less than that between the 3rd genital setae. It may be easily separated from *L. keegani* by the blunt, peglike seta posteriorly on coxae II and III, and from *L. transvaalensis* by the significantly longer adanal setae, the broader anal plate, and the generally more elongate dorsal plate. In *L. congoicola* the 1st sternal setae are longer, reaching to or beyond the moderately invaginated posterior margin of the sternal plate. As noted previously, *L. lavoipierrei* differs in the very small, blunt distal seta of coxa I.

L. simillimus has been collected almost exclusively from southern Africa, reach-

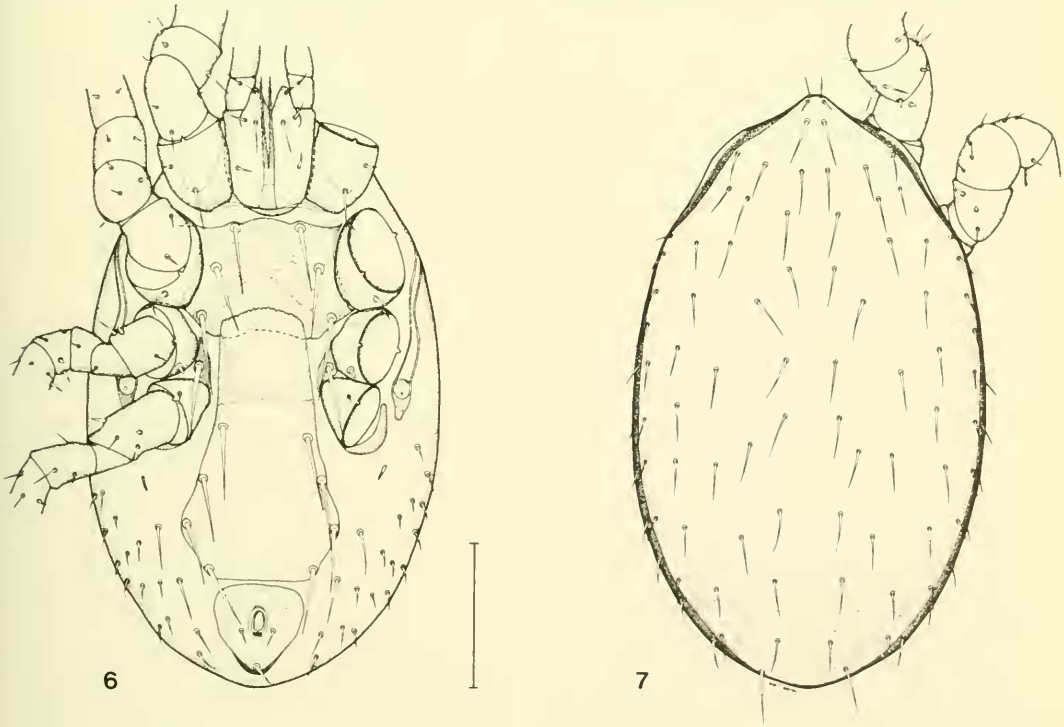
[3]AMP = African Mammal Project
[4]ORS = Orange River Survey.

ing no further north than Angola and Congo-Leopoldville. It is recorded from a variety of small mammals, but primarily from species of *Aethomys*, and most frequently from *Aethomys chrysophilus*.

Laelaps (*Laelaps*) *parasimillimus*, n. sp.
Figs. 6-7

Holotype, female; Type locality: 10 mi. WNW Soubre, Ivory Coast; in U.S. National Museum, Washington, D.C.

DESCRIPTION.— *Female*: (Figs. 6-7) Dorsal plate length 405 μ, width 244 μ. Gnathosomal and hypostomal setae setaceous; median hypostomal setae of medium length, not reaching base of gnathosomal setae. Posterior margin of sternal plate very slightly invaginated medially; setae st. I of moderate length, reaching about one-third distance between 2nd and 3rd sternal setae; sternal setae as well as 4 pairs of genital setae of moderate length and rather slender. Anterior flap of genital plate overlapping posterior margin of sternal plate to or slightly anterior to level of 3rd sternal setae; distance between 1st genital setae distinctly less than distance between 4th genital setae; distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roundly triangular in shape, approximately as wide as long with rounded margins; adanal setae very short and small, length approximately equal to width of anal orifice; adanal setae set at level of posterior third of anal orifice; postanal seta rather small but somewhat larger than adanals and somewhat more robust. Unarmed venter bearing approximately 13 pairs of setae, medial 3 pairs adjacent to genital and anal plates longer with lateral pairs much shorter, some being almost spinelike; metapodal plates small, elongate oval. Peritreme extends to level of middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length distinctly less than distance between adjacent setae; subterminal setae (5) rather small and slender, reaching no further than level of base of terminal setae; terminal setae considerably larger and more robust than all other dorsal setae. Six to 8 pairs of rather small spinelike setae border dorsal opisthosoma



Figs. 6-7. *Laelaps parasimillimus* n. sp., female. (6) venter; (7) dorsum. scale = 100μ.

on soft integument. Proximal seta of coxa I of moderate length and robust, distal seta of coxa I quite small and slender; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV rather small, setaceous, although somewhat enlarged basally; posterior seta of coxae II and III rather small but robust and peglike; preapical setae of tarsi mostly setaceous as well as all other leg setae.

Male: Unknown.

TYPE MATERIAL
Dephomys defua
Ivory Coast (10 mi WNW Soubre); female holotype and 1 deutonymph (LWR 1471).
Malacomys longipes
Ivory Coast (10 mi WNW Soubre); 2 females (LWR 1478).

REMARKS.— *L. parasimillimus* may be distinguished from all other closely related taxa by the following combination of characters: more than 10 pairs of mostly small setae ventrally adjacent to genital and anal plates; rather wide genital plate at level of 3rd genital setae; short adanal setae; distal seta of coxa I much shorter than proximal seta; small peglike seta posteriorly on coxae II and III; rather broad anal plate; and greater length of sternal plate.

This new species has been collected only from Ivory Coast on *Dephomys defua* and *Malacomys longipes*.

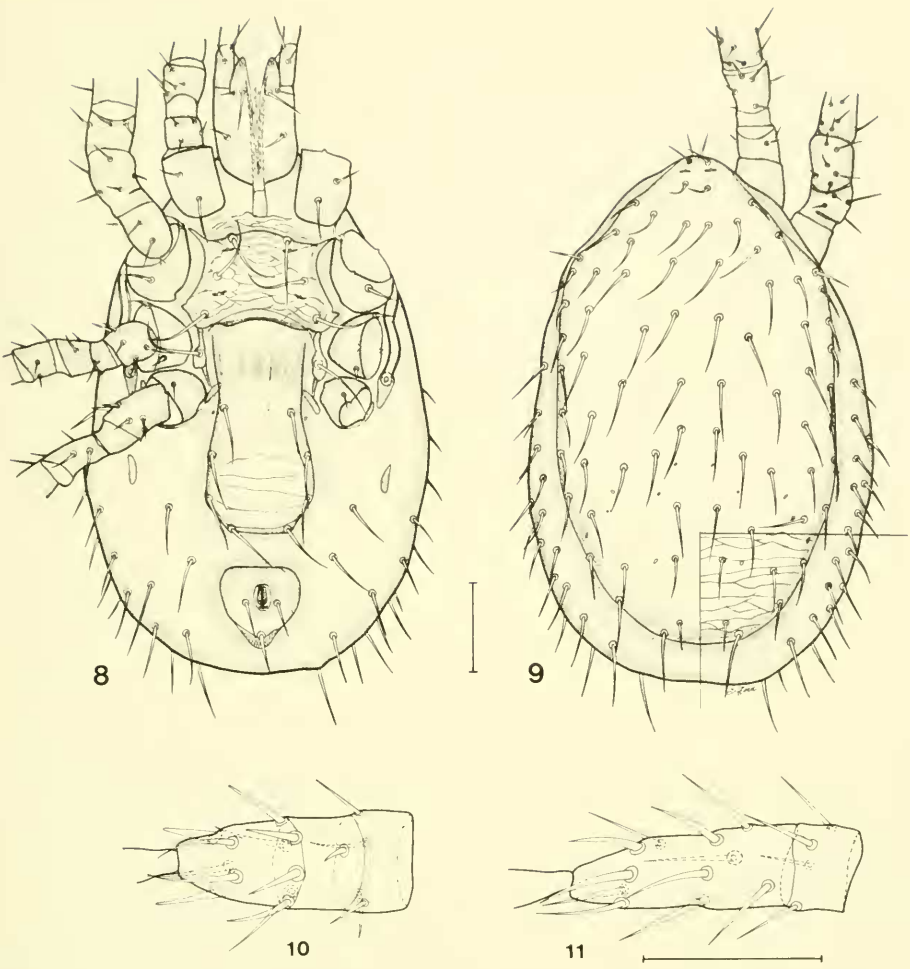
Laelaps (*Laelaps*) *keegani* Thurman

Figs. 8-13

Laelaps berlesi Keegan, 1956, J. Egypt. Phl. Hlth. Assoc. 31 (6):264-265 (Holotype: Pyramids, Giza, Egypt; U.S. National Museum, Washington, D.C.).
Laelaps keegani Thurman, 1958, Ent. Soc. Wash. 60 (2):74. Paperna, Furman, and Rothstein, 1970, Rev. Zool. Bot. Afr. 81 (3-4):330-336 (Host locality).

DESCRIPTION.— *Female*: (Figs. 8-11) Dorsal plate length 505 μ, width 301 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length but not reaching base of gnathosomal setae. Posterior margin of sternal plate only slightly invaginated; setae st. 1 of moderate length, reaching to point halfway between setae st. 2 and st. 3. Anterior flap of genital plate slightly overlapping posterior of sternal plate; distance between 1st pair of genital setae slightly greater than distance between 4th genital setae; in type specimens, greatest width of genital plate at level of 3rd genital setae; however, in specimens from Nigeria greatest width of genital plate at level of 2nd pair of genital setae. Posterior margin of genital plate truncate as well as anterior margin of anal plate; anal plate width subequal to length; adanal setae slender reaching to base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta robust, slightly longer than adanal setae. Unarmed venter bearing about 16 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates with others on posterior lateral and lateral body margins; metapodal plates rather elongate and narrow. Peritreme extending to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of moderate length, length equal to distance between adjacent setae; subterminal setae (J5) reach to or slightly beyond posterior margin of dorsal plate. Approximately 18 pairs of setaceous setae border dorsal plate on soft integument. Both proximal and distal setae of coxa I setaceous, with proximal seta 1.5 times as long as distal seta; setae pd 1 and ad 1 of femur I relatively short, subequal in length, with ad 1 seta only slightly longer; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV setaceous; posterior seta of coxa III rather small and peglike (bluntly spinelike); tarsus II with one bluntly spinelike preapical seta; all other leg setae setaceous.

Male: (Figs. 12-13) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, of moderate length and slender, each extending slightly beyond base of adjacent posterior seta; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bears 5 pairs of setaceous setae; adanal setae rather short, approximately equal to length of anal orifice; adanal setae set at level near middle of anal orifice; postanal seta approximately



Figs. 8-11. *Laelaps keegani* Thurman, female. (8) venter; (9) dorsum, scale = 100μ; (10) ventral view of tarsus II; (11) ventral view of tarsus III, scale = 50μ.

twice as long as adanal setae and somewhat more robust. Metapodal plates inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bears approximately 10 to 12 pairs of setaceous setae adjacent to holoventral plate; peritreme extends to middle of coxae I. Dorsal plate bears 39 pairs of setaceous setae; length and position of setae approximately as in female. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior setae of coxae II and III, posterior seta of coxae II and III, and seta of coxa IV setaceous, with posterior seta of coxa III somewhat more robust and spinelike; most leg setae setaceous and normally developed; however, some may be shorter and somewhat spinelike.

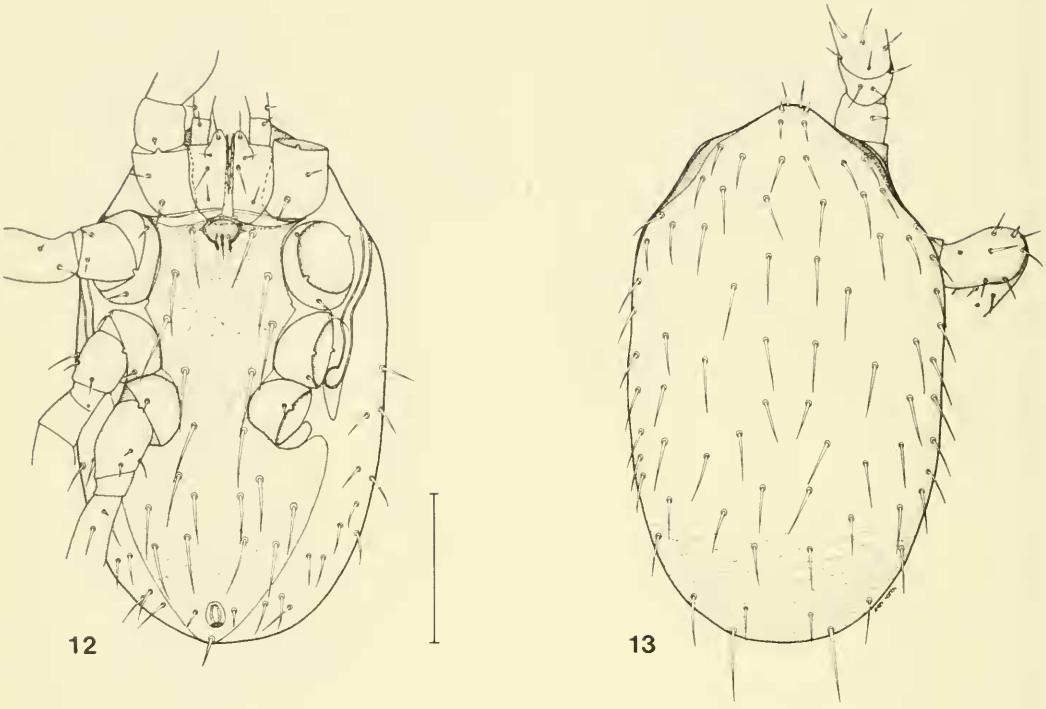
COLLECTION RECORDS

Atelerix albiventris
Upper Volta: 1 coll. (1 female); AMP

Crocidura sp.
Upper Volta; 1 coll. (3 females, 1 male, 1 ny.); AMP

Tatera kempi
Dahomey; 1 coll. (1 female); AMP

Arvicanthis niloticus
Egypt (Giza); holotype female; Keegan, 1956
Ghana (Accra-Tema); Paperna, et al., 1970
Nigeria; Zumpt Collection (AMP)
Ghana; 1 coll. (1 female); AMP
Ivory Coast; 10 coll. (19 females, 1 male); AMP



Figs. 12-13. *Laelaps keegani* Thurman, male. (12) venter; (13) dorsum, scale = 100μ.

Nigeria; 23 coll. (62 females, 3 males, 7 ny.); AMP
Senegal; 3 coll. (18 females); AMP

Mus musculoides
Ghana; 1 coll. (4 females, 1 ny.); AMP

Felis lybica
Upper Volta; 1 coll. (1 female); AMP

Unknown
Nigeria; 2 coll. (13 females); AMP

Remarks.— *L. keegani* is quite distinctive in one key character which is invariant in all specimens examined in this study; this character is the setaceous or spinelike posterior seta of coxae II and III, rather than blunt, peglike setae as in all other closely related taxa. In addition to this character, *L. keegani* may be separated from certain other taxa by the longer adanal setae and the broad anal plate.

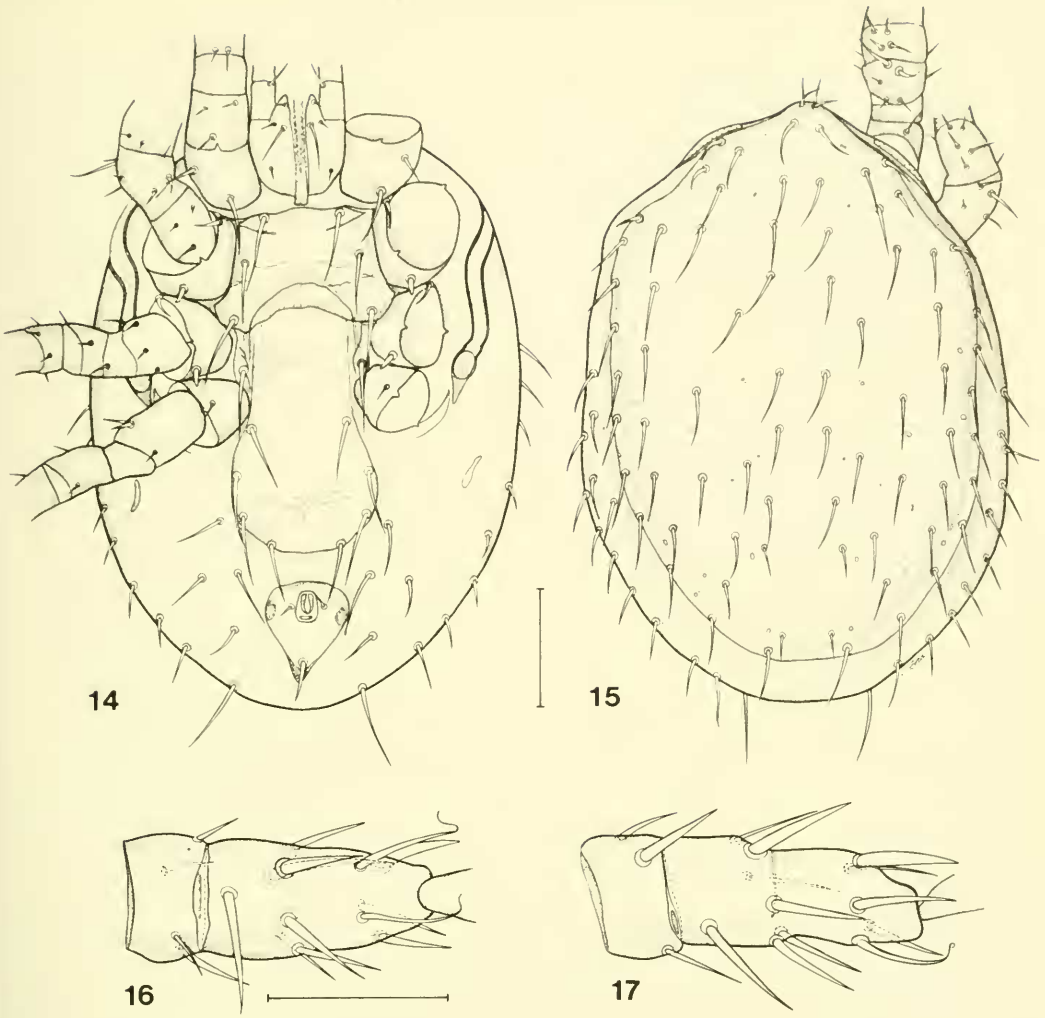
L. keegani was originally recorded from Giza, Egypt, on *Arvicanthis niloticus* Subsequently, it has been collected from the countries of northwest Africa south of the Sahara and almost exclusively from *Arvicanthis niloticus*.

Laelaps (*Laelaps*) *transvaalensis* Zumpt

Figs. 14-19

Laelaps transvaalensis Zumpt. 1950, S. Afr. J. Med. Sci. 15: 77-82 (Holotype: Krugersdorp, Transvaal, South Africa; So. Afr. Inst. Med. Res., Johannesburg); Taufflieb, 1959, J. Ent. Soc. So. Afr. 22(2):404-408 (key); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):262-264, 283-284 (key, synopsis); Zumpt, 1961, Publ. So. Afr. Inst. Med. Res. 4(1):30 (host, locality).

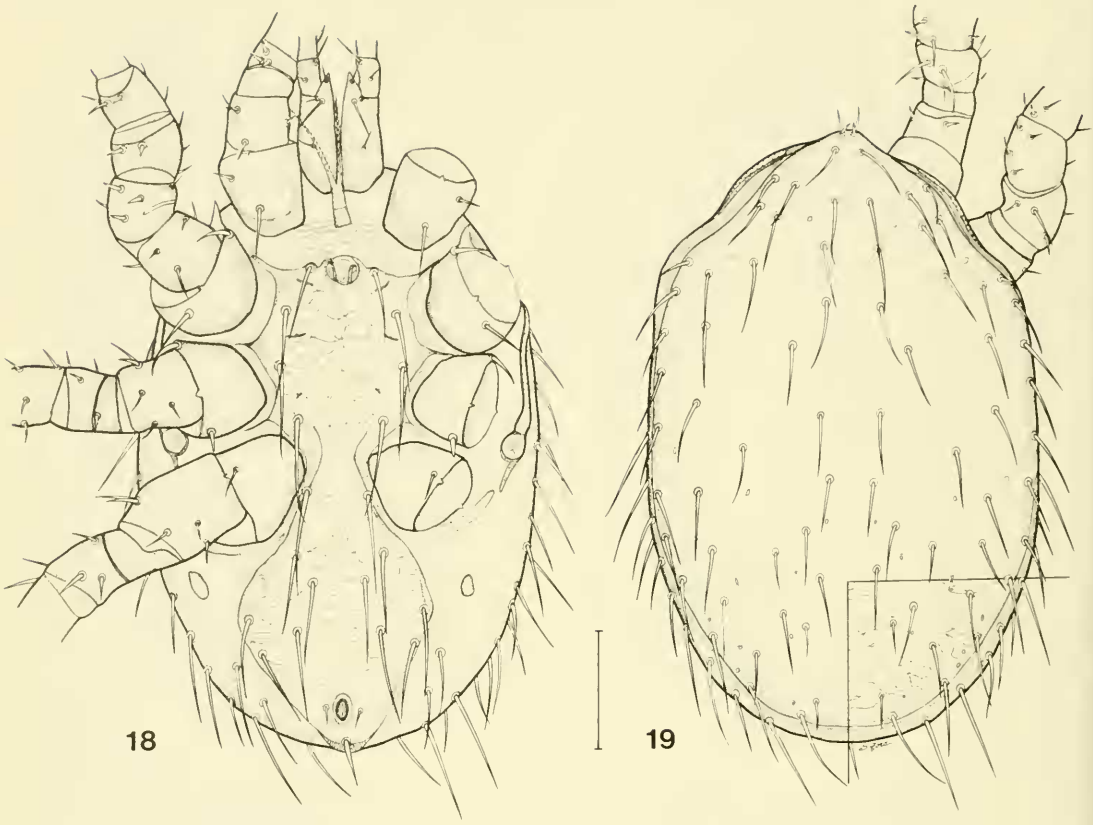
Description.— *Female*: (Figs. 14-17) Dorsal plate length 460 μ, width 317 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching to base of gnathosomal setae. Posterior margin of sternal plate invaginated to or slightly beyond level of setae st. 3; setae st. 1 of moderate length, reaching to point halfway between setae st. 2 and st. 3. Anterior flap of genital plate overlapping posterior of sternal plate; distance between 1st genital setae slightly but distinctly further apart than 4th genital setae; greatest width of genital plate at or slightly behind level of 2nd pair of genital setae. Anal plate distinctly



Figs. 14-17. *Laelaps transvaalensis* Zumpt, female. (14) venter; (15) dorsum, scale = 100μ; (16) ventral view of tarsus II; (17) ventral view of tarsus III, scale = 50μ.

longer than wide; adanal setae short, length less than distance from adanal setae to postanal seta; adanal setae set at level of middle of anal orifice; oval reticulate pattern near anterolateral margins of anal plate. Unarmed venter bearing about 10 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus 6 pairs near or on posterolateral body margins; metapodal plates elongate oval. Peritreme extends to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; central and lateral setae of moderate length (length equal to distance between adjacent setae); setae i1, r1, r2, r3, r4, J4 and J5 shorter; subterminal setae (J5) reaching to posterior margin of dorsal plate; distance between setae J4 greater than that between setae J5. Ten to 12 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, with proximal seta 1.5 times as long as distal seta; setae pd 1 and ad 1 of femur I subequal in length, with ad 1 seta only slightly longer; anterior seta of coxae II and III setaceous and enlarged somewhat basally; posterior seta of coxae II and III robust, peglike (bluntly spiniform); tarsi II and III each with one spinelike preapical seta; all other leg setae setaceous, some may be heavier than others but not distinctly spinelike.

Male: (Figs. 18-19) Gnathosomal and



Figs. 18-19. *Laelaps transvaalensis* Zumpt, male. (18) venter: (19) dorsum, scale = 100μ.

hypostomal setae all setaceous, with medial hypostomal setae two times as long as gnathosomal setae. Ventral setae, except adanals and postanal, of moderate length, each extending in length beyond base of seta immediately posterior by about one-third its length; holoventral plate rather narrow between coxae IV and considerably expanded posteriorly; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae short, length less than distance between adanals and postanal seta; postanal seta spinelike and at least two times as long as adanals. Metapodal plates elongate oval; unarmed venter bearing 2 pairs of setae adjacent to holoventral plate plus about 5 pairs on posterolateral margins of body. Peritreme extends to level of middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae as in female. Soft integument of opisthosoma bearing about 9 pairs of setae. Both proximal and distal setae of coxa I setaceous, with proximal seta nearly two times as long as distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III setaceous and enlarged basally; posterior seta of coxa II elongate and setaceous, whereas posterior seta of coxa III short and peglike; tarsi II and III each with one preapical spinelike seta, and all legs with some ventral short spinelike setae.

COLLECTION RECORDS

Crocidura sp.
South Africa; 1 coll. (1 female); Zumpt, 1961
Macroscelides proboscideus
South Africa (ORS); 1 female; AMP
Cryptomys hottentotus
South Africa; 1 coll. (6 females); AMP
Petromus typicus
South Africa (ORS); 1 female; AMP
Tatera leucogaster
South Africa; 1 female; AMP
Aethomys chrysophilus
South Africa; 7 coll. (10 females, 7 males); AMP
Aethomys namaquensis
South Africa (Transvaal); 1+ coll.

Mastomys natalensis
South Africa; 1 female; Zumpt, 1961
Myomys daltoni
Senegal; 1 female; AMP
Rhabdomys pumilio
South Africa; 1+ coll.; Zumpt, 1961
South Africa; 5 coll. (6 females, 4 males); AMP
Saccostomus campestris
South Africa; 1 female; AMP
Otomys angoniensis
South Africa (ORS); 1 coll. (15 females, 2 males); AMP
Otomys irroratus
South Africa (Transvaal); holotype and 4 females; Zumpt, 1950
South Africa (Transvaal); 1+ coll.; Tipton, 1960
South Africa; 3 coll. (13 females); AMP
Unknown host
South Africa (ORS); 2 coll. (5 females); AMP
South Africa; 12 coll. (23 females, 11 males); AMP
Botswana; 1 coll. (2 females); AMP

REMARKS.— *L. transvaalensis* may be easily separated from other taxa by the form of the anal plate, i.e., narrower anal plate with short adanal setae and pair of dark areas laterally. Other distinguishing characters are as follows: dorsal plate rather broad relative to length; peritremes wider posteriorly than usual for the genus; moderately emarginated posterior margin of sternal plate; unusually long proximal seta of coxa I; and rather broad genital plate posteriorly.

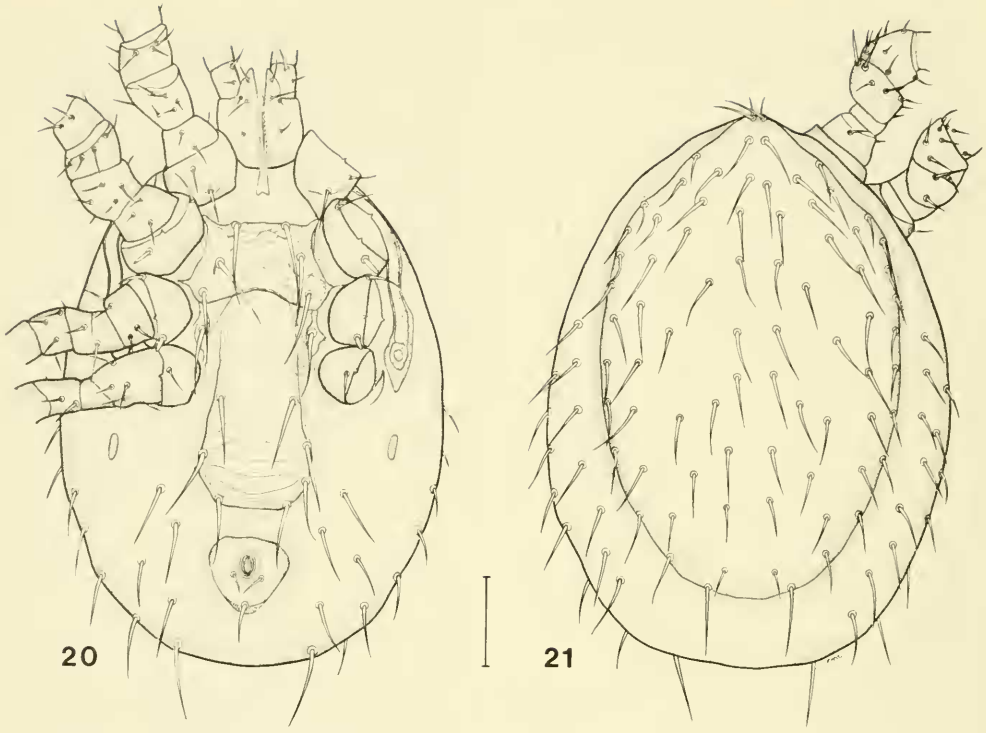
This species is recorded almost exclusively from South Africa from a great variety of small mammal hosts. One collection is recorded from Botswana and one, possibly erroneous identification, from Senegal. More collections and specimens have been collected from species of *Otomys* than from any other host. It is anticipated that future records will reveal a much wider geographic distribution in southern Africa than the currently available records indicate.

Laelaps (*Laelaps*) *congoicola* Taufflieb
Figs. 20-23

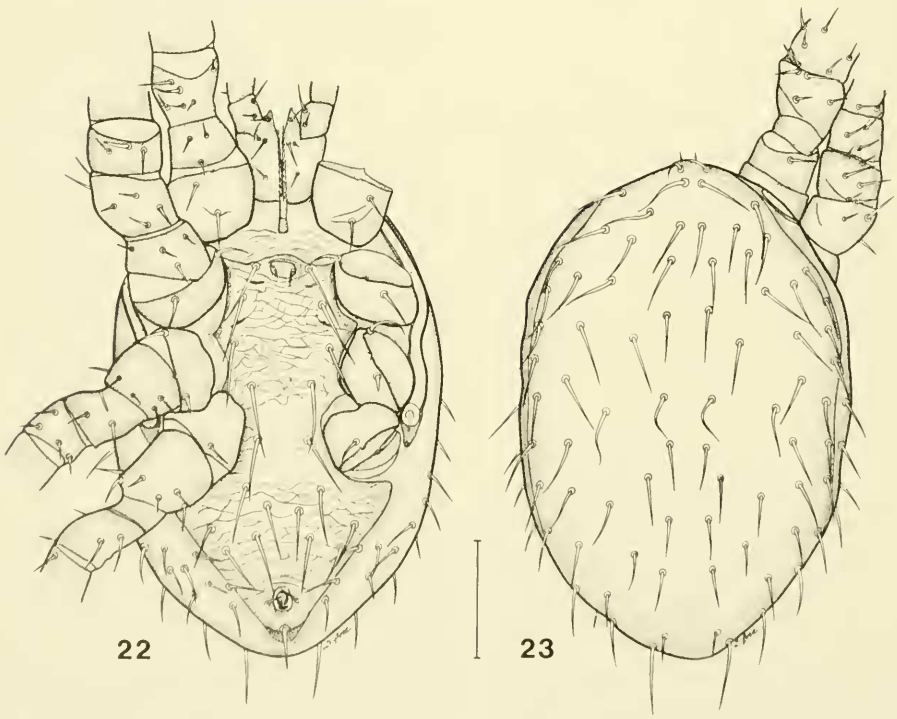
Laelaps congoicola Taufflieb, 1959. J. Ent. Soc. S. Afr. 22(2):397-398 (Holotype: Brazzaville, Congo; Museum d'Histoire Naturelle, Paris).

DESCRIPTION.— *Female*: (Figs. 20-21) Dorsal plate length 538 μ, width 349 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae relatively long, reaching almost to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching to level of third sternal setae; setae st. 1 long, reaching well beyond posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior margin of sternal plate slightly; distance between 1st genital setae slightly greater than distance between 4th genital setae, distance between 2nd genital setae slightly greater than distance between 3rd genital setae; greatest width of genital plate at level slightly anterior to 3rd genital setae. Anal plate roundly triangular, width equal to length, with anterior margins rounded; adanal setae rather short, extending no further than base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing about 8 to 10 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus approximately 4 to 6 pairs near or on posterior lateral body margins; metapodal plates oval to elongate-oval, length about twice width. Peritreme extends to level of anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching to or slightly beyond posterior margin of dorsal plate; terminal setae (Z5) much longer than other adjacent setae. About 12 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, proximal seta distinctly longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV slender, setaceous; posterior seta of coxae II and III robust, blunt and peglike, with posterior seta of coxa II somewhat longer than that of coxa III; no robust, blunt preapical setae on tarsi II, III, or IV; however, one or two spinelike preapical setae may be present on tarsi II and III; most other leg setae setaceous and normally developed.

Male: (Figs. 22-23) Gnathosomal and hypostomal setae setaceous, with medial hypostomal setae of moderate length, extending almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, relatively long, each extending well beyond base of seta immediately adjacent; holoventral plate rather broad between coxae II and III.



Figs. 20-21. *Laelaps congoicola* Taufflieb, female. (20) venter; (21) dorsum. scale = 100μ.



Figs. 22-23. *Laelaps congoicola* Taufflieb, male. (22) venter; (23) dorsum. scale = 100μ.

narrowing considerably between coxae IV, and greatly expanded immediately posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, not extending to base of postanal seta; adanal setae set slightly posterior to level of middle of anal orifice; postanal seta considerably longer than adanal setae and rather robust. Metapodal plates inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing 6 to 9 pairs of setaceous setae, about 3 or 4 pairs set quite close to holoventral plate laterally. Peritreme extending to middle or anterior of coxa I. Dorsal plate bears 39 pairs of setaceous setae; length and position of setae as in female. Both proximal and distal setae of coxa I setaceous, with proximal seta slightly longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III, posterior seta of coxa II and seta of coxa IV all setaceous; posterior seta of coxa III robust and spinelike; no blunt preapical setae on tarsi II, III, or IV; however some preapical setae may be spinelike; most other leg setae setaceous and normally developed.

COLLECTION RECORDS

Oenomys hypoxanthus

French Congo (Brazzaville): 35 females (type specimens); Taufflieb, 1959

REMARKS.— The most distinguishing characters of *L. congoicola*, separating it from other closely related taxa, are the long st. 1 setae and the moderate posterior invagination of the sternal plate, i.e., setae st. 1 extends to or beyond posterior margin of sternal plate. Other diagnostic characters are as follows: relatively broad oval dorsal plate; medium-length adanal setae; blunt, peglike seta on posterior of coxae II and III; and setaceous proximal and distal setae of coxa I.

This taxon has been reported only from *Oenomys hypoxanthus* in French Congo (Brazzaville).

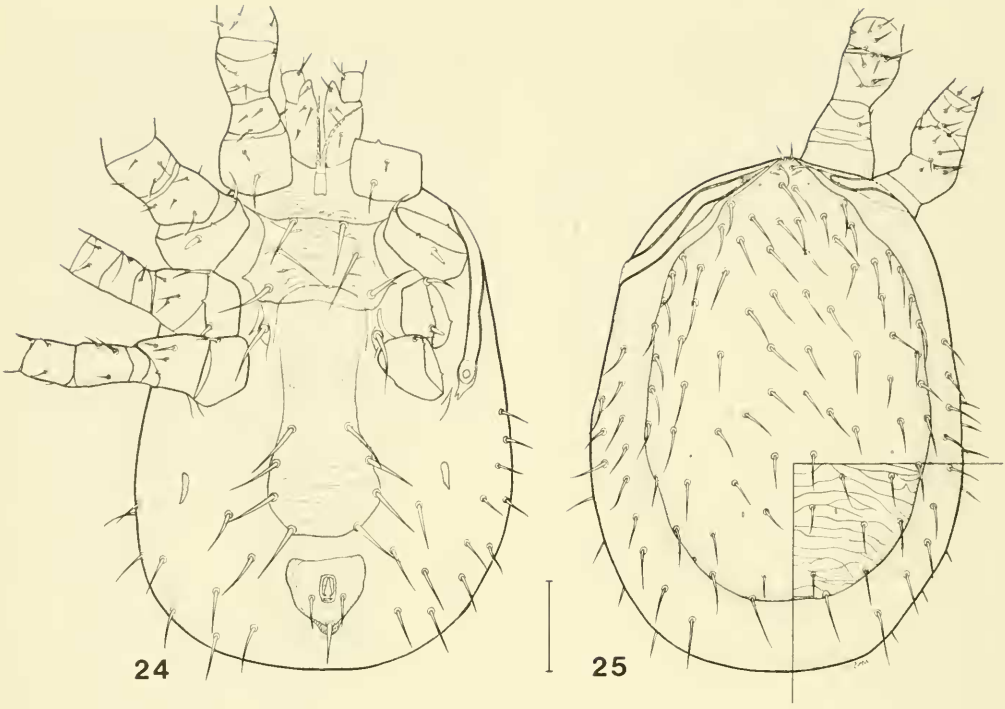
Laelaps (*Laelaps*) *lavoipierrei* Taufflieb

Figs. 24-27

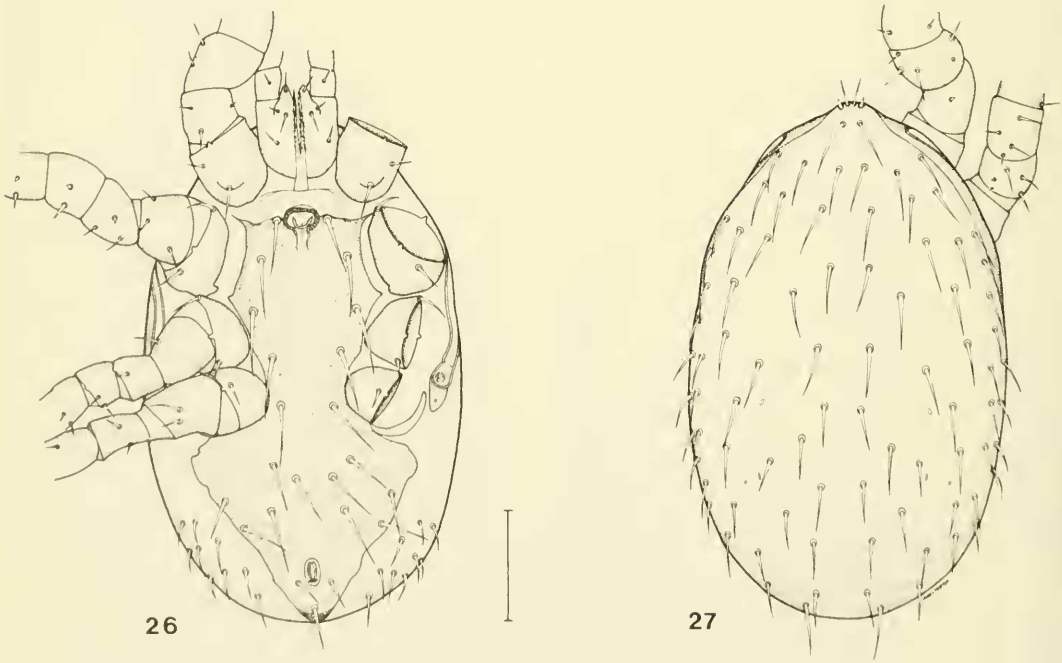
Laelaps lavoipierrei Taufflieb, 1954, Ann. Parasit. 29(4):440 (Holotype: Brazzaville, Congo; Institut Pasteur, Paris); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):274.

DESCRIPTION.— *Female*: (Figs. 24-25) Dorsal plate length 495 μ, width 315 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Posterior margin of sternal plate only very slightly invaginated medially; setae st. 1 of moderate length, reaching to level approximately halfway between setae st. 2 and st. 3. Anterior flap of genital plate overlapping posterior margin of sternal plate at least to level of 3rd sternal setae; distance between 1st genital setae subequal to distance between 4th genital setae, distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roughly triangular in shape, as wide as long, with anterior margins concave or invaginated; adanal setae of moderate length, extending slightly beyond base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta rather robust and slightly longer than adanal setae. Unarmed venter bearing 10 to 14 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus approximately 6 to 8 pairs near or on posterior lateral body margin; metapodal plates elongate, considerably longer than wide. Peritreme extends to level of middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length almost equal to distance between adjacent setae; subterminal setae (J5) reaching almost to posterior margin of dorsal plate. Nine to 12 pairs of setae border dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous and of moderate length, distal seta of coxa I quite small, blunt and peglike; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; no robust, blunt preapical setae on tarsi II, III, or IV; however often with one spinelike seta on coxae II and III; most other leg setae setaceous and normally developed.

Male: (Figs. 26-27) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal



Figs. 24-25. *Laelaps lavoipierrei* Taufflieb, female. (24) venter; (25) dorsum. scale = 100μ.



Figs. 26-27. *Laelaps lavoipierrei* Taufflieb, male. (26) venter; (27) dorsum. scale = 100μ.

setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate rather broad between coxae II and III greatly narrowing between coxae IV, and greatly expanding posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending to or slightly beyond base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta slightly longer than adanal setae and slightly more robust. Metapodal plate inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing approximately 8 to 10 pairs of setaceous setae, those more marginal and more posterior somewhat longer. Peritreme extends to level of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae approximately as in female. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length, both rather short; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa III short and spinelike; several preapical setae of tarsi II and III rather robust and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and somewhat spinelike.

Collection records

Hipposideros baetus
Ivory Coast: 1 coll. (1 female): AMP

Lophuromys sikapusi
Congo (Brazzaville); 3 females (type specimens); Taufflieb, 1954
Cameroon (Yaounde): Taufflieb, 1962
Ghana; 26 coll. (59 females, 3 males, 5 ny.); AMP
Ivory Coast; 21 coll. (104 females, 14 males, 3 ny.); AMP
Nigeria; 11 coll. (57+ females, 1 male, 1 ny.); AMP

Mastomys natalensis
Ivory Coast; 1 coll. (1 female, 1 male); AMP
Upper Volta; 1 coll. (1 female); AMP

Mus musculoides
Ghana; 1 coll. (1 female); AMP

Praomys tullbergi
Ivory Coast; 1 coll. (1 female, 6 ny.); AMP

Uranomys ruddi
Ghana; 1 coll. (3 females); AMP

Remarks.— *L. lavoipierrei* may be easily separated from all other taxa by the very small, blunt, peglike distal seta of coxa I. In this one character alone it resembles taxa of major group II, but on the basis of overall morphological characters it is placed in major group I near *L. congoicola* and *L. grenieri*. Another character which may be used to separate *L. lavoipierrei* from the latter two taxa is the straight to concave shape of the anterior margin of the anal plate, rather than a rounded, convex margin.

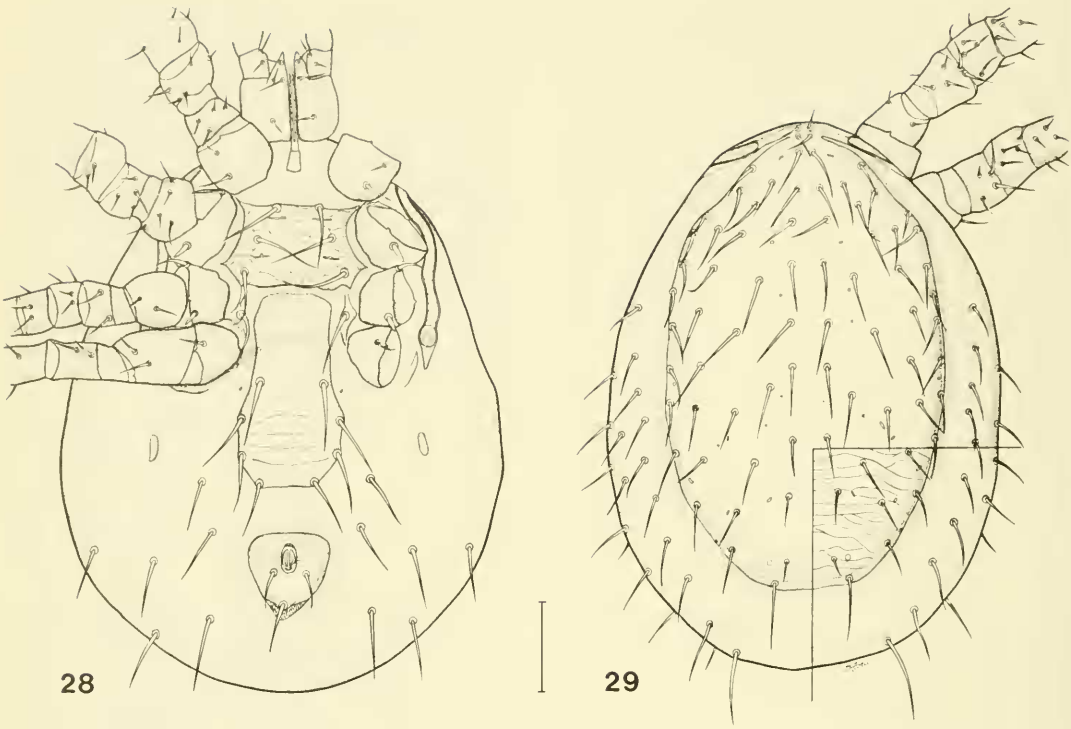
This mite is parasitic primarily on *Lophuromys sikapusi* in northwest Africa south of the Sahara. Single collections have been recorded from several other small mammals.

Laelaps (*Laelaps*) *grenieri* Taufflieb

Figs. 28-29

Laelaps grenieri Taufflieb, 1954, Ann. Parasit. 29(4):439 (Holotype: Brazzaville, Congo; Institut Pasteur, Paris): Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):270.

Description.— *Female*: (Figs. 28-29) Dorsal plate length 515 μ, width 307 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching at least half distance to gnathosomal setae. Posterior margin of sternal plate irregularly straight to very slightly invaginated; setae st. 1 relatively long, reaching almost to level of 3rd sternal setae. Anterior flap of genital plate not overlapping posterior margin of sternal plate; distance between 1st genital setae slightly greater than distance between 4th genital setae, distance between 2nd genital setae slightly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate roughly triangular in shape, as wide as long, with anterior margin almost straight; adanal setae of moderate length, extending somewhat beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing 6 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus 2 pairs near or on posterior lateral body margin; metapodal plates elongate-oval. Peritreme extends to level of anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of moderate length, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching only to level of base of terminal



Figs. 28-29. *Laelaps grenieri* Taufflieb, female. (28) venter; (29) dorsum, scale = 100μ.

setae; terminal setae rather long and slender. Fourteen to 18 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; no robust, blunt preapical setae on tarsi II, III, or IV; however, some preapical setae may be spinelike; most other leg setae setaceous and normally developed.

Male: Unknown.

COLLECTION RECORDS

Tadarida major
Upper Volta; 1 coll. (2 females); AMP

Tatera Kempi
Dahomey; 1+ coll. (1+ female); Zumpt coll. (AMP)

Dasymys incomptus
Congo (Brazzaville); Taufflieb, 1962

Hybomys trivirgatus
Ivory Coast; 4 coll. (26 females, 4 ny.); AMP

Lemniscomys barbarus
Ghana; 2 coll. (2 females); AMP
Upper Volta; 2 coll. (10 females, 1 ny.); AMP

Lemniscomys maculeus
Ivory Coast; 2 coll. (8 females); AMP

Lemniscomys striatus
Congo (Brazzaville); 6 females (type specimens); Taufflieb, 1954
Ghana; 1 coll. (3 females); AMP
Ivory Coast; 8 coll. (29 females, 1 male); AMP
Nigeria; 11 coll. (41 females, 1 ny.); AMP
Togo; 8 coll. (19 females); AMP

Lophuromys sikapusi
Nigeria; 1 coll. (7 females); AMP

Mus musculoides
Congo (Brazzaville); 1 coll. (1 female); Taufflieb, 1954

Myomys daltoni
Ghana; 1 coll. (1 female); AMP

Praomys tullbergi
Nigeria; 1 coll. (1 female); AMP

Uranomys oweni
Senegal; 2 coll. (2 females); AMP

Uranomys ruddi
Ivory Coast; 3 coll. (13 females, 1 ny.); AMP

Unknown
Dahomey; 1 coll. (2 females); AMP
Ivory Coast; 2 coll. (6 females, 1 ny.); AMP

REMARKS.— There is no one character which may be used to distinguish *L. grenieri* from all other taxa of this subgroup as in the case of *L. keegani*, *L. transvaalensis*, *L. congoicola*, and *L. lavoipierrei*. This taxon may be separated from *L. simillimus* and *L. parasimillimus* by the greatest width of the genital plate at the level of the 2nd genital setae rather than at the level of the 3rd, the metapodal plates more irregularly oval rather than elongate, and the greater length width ratio of the sternal plate (greater than .75).

L. grenieri has been recorded from a variety of different small mammal hosts in northwestern Africa south of the Sahara; however, it is parasitic primarily on several species of *Lemniscomys*.

Subgroup B

This subgroup is composed of only four taxa: *L. lavieri*, *L. fritzumpti*, *L. thamnomys*, and *L. moucheti*. The first two and the fourth taxa bear at least one blunt, peglike setae preapically on tarsi II and III, whereas tarsi II and III of *L. thamnomys* bear all setaceous setae. This latter species is placed with subgroup B because of its overall phenetic similarity to the other three species.

Laelaps (*Laelaps*) *lavieri* Taufflieb

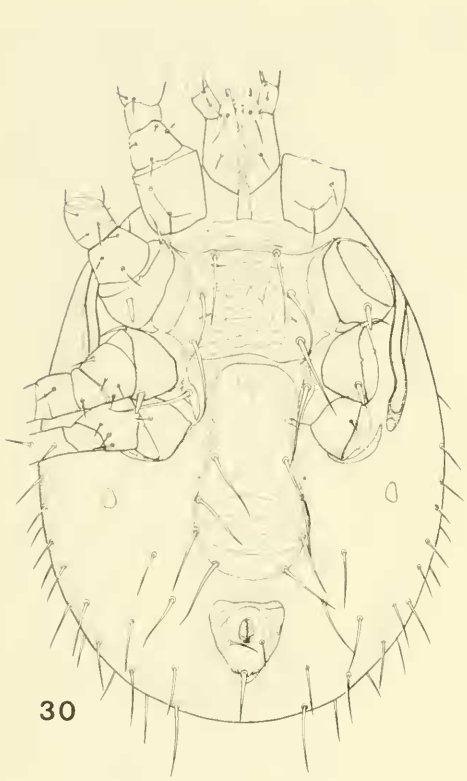
Figs. 30-35

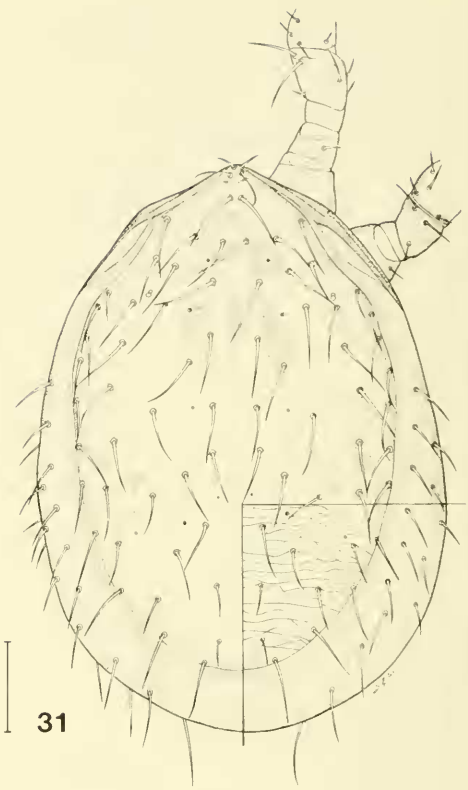
Laelaps lavieri Taufflieb, 1954. Ann. Parasit. 29(4):442 (Holotype: Brazzaville, Congo: Institut Pasteur, Paris); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):273-274.

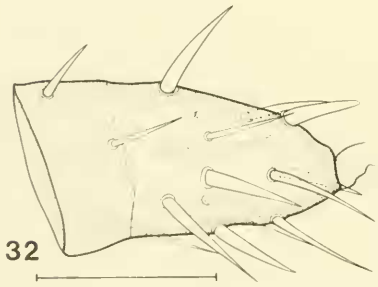
Laelaps nigeriensis Keegan, 1962. J. Parasit. 48(4):621-622 (Holotype: Adu, Nigeria; United States National Museum, Washington, D.C.).

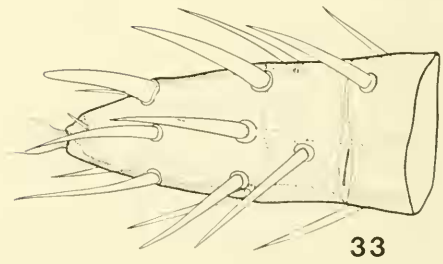
DESCRIPTION.— *Female*: (Figs. 30-33) Dorsal plate length 600 μ, width 419 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae relatively long, reaching almost to base of gnathosomal setae. Posterior margin of sternal plate very slightly invaginated medially. Anterior flap of genital plate not overlapping posterior margin of sternal plate; distance between 1st genital setae subequal to distance between 4th genital setae, and distance between 2nd genital setae subequal to distance between 3rd genital setae; greatest width of genital plate near or slightly anterior to level of 3rd genital setae. Anal plate triangular in general shape, longer than wide, and with anterior margin slightly invaginated; adanal setae of moderate length, extending to base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 14 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus approximately 10 pairs near or on posterior body margins; metapodal plates oval, slightly longer than wide. Peritreme extending to level of posterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length usually equal to distance between adjacent setae; subterminal setae (J5) reaching at least to level of terminal setae and possibly to posterior margin of dorsal plate. Twelve to 14 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; tarsi II and III each with one robust, blunt preapical setae plus one spinelike seta; all other leg seta setaceous and normally developed.

Male: (Figs. 34-35) Gnathosomal and hypostomal setae setaceous, with medial hypostomal setae somewhat longer than gnathosomal setae but not reaching to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, relatively long, extending well beyond base of seta immediately posterior; holoventral plate broad between coxae II and III, narrowing considerably between coxae IV and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, extending no further than base of postanal seta; postanal seta much longer than adanal setae. Metapodal plates inapparent, apparently fused to lateral margin of holoventral plate. Unarmed venter bearing 9 or 10 pairs of setae immediately adjacent to holoventral plate, plus 8 to 10 pairs on posterior lateral body margin. Peritreme extends to level of posterior or middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; posterior dorsal setae relatively long, length considerably









Figs. 30-33. *Laelaps lavieri* Taufflieb, female. (30) venter; (31) dorsum, scale = 100μ; (32) ventral view of tarsus II; (33) ventral view of tarsus III, scale = 50μ.

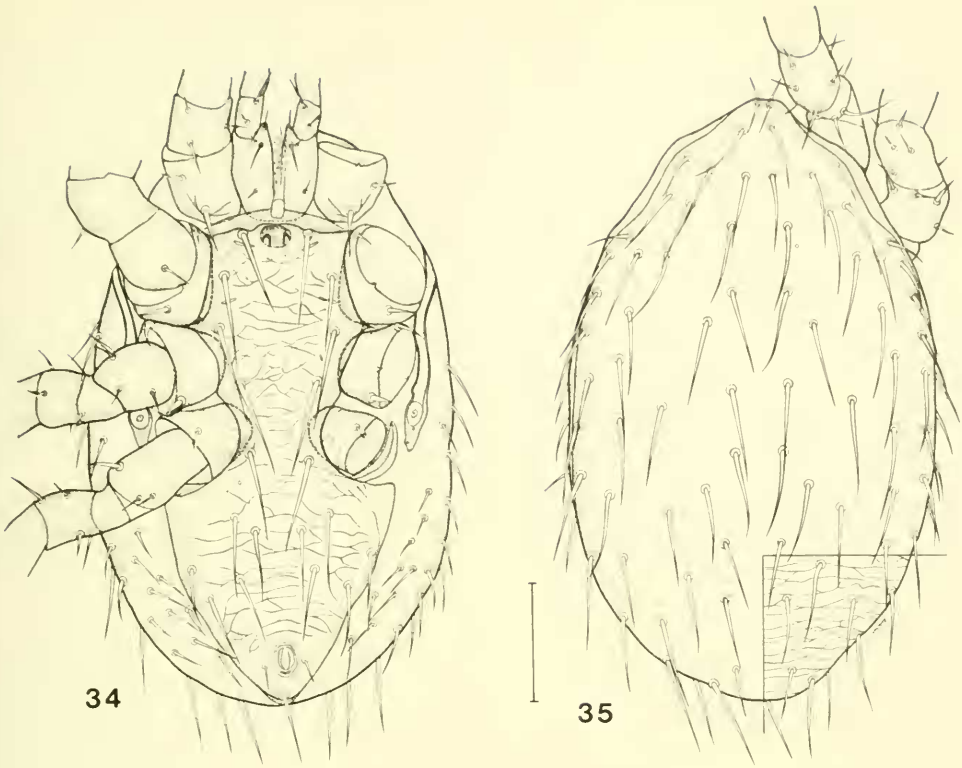
greater than distance between adjacent setae; subterminal setae (J5) extending well beyond posterior margin of dorsal plate and about half the length of the terminal setae; both proximal and distal setae of coxa I setaceous, with proximal seta considerably longer and more robust basally than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa III relatively short and spinelike; tarsi II and III each with two or three rather robust, spinelike to peglike preapical setae; other leg setae mostly setaceous and normally developed.

COLLECTION RECORDS

Crocidura sp.
Nigeria (Adu); 2 females; Keegan, 1962

Sylvisorex gemmeus
Ghana; 1 coll. (1 female, 1 male); AMP

Hypsignathae monstrosus
Ivory Coast; 1 coll. (1 female); AMP



Figs. 34-35. *Laelaps lavieri* Taufflieb, male. (34) venter; (35) dorsum, scale = 100μ.

Nycteris arge
Upper Volta; 1 coll. (1 female, 1 male); AMP
Hipposideros caffer
Ivory Coast; 2 coll. (3 females, 1 male, 2 ny.); AMP
Hipposideros cyclops
Ivory Coast; 1 coll. (1 female); AMP
Tatera leucogaster
South Africa; 2 coll. (2 females); AMP
South Africa (ORS); 1 coll. (1 female); AMP
Aethomys chrysophilus
Rhodesia; 1 coll. (1 female); AMP
South Africa; 1 coll. (2 females); AMP
South Africa (ORS); 2 coll. (2 females); AMP
Lemniscomys macculeus
Ivory Coast; 1 coll. (3 females); AMP
Lemniscomys striatus
Togo; 2 coll. (3 females); AMP
Lophuromys sikapusi
Ghana; 1 coll. (10 females); AMP
Mastomys natalensis
Ghana; 1 coll. (1 female); AMP
South Africa; 1 coll. (1 female, 1 male); AMP
South Africa (ORS); 4 coll. (6 females); AMP
Mus sp.
Angola (Dundo); 2 females; Taufflieb, 1962
Cameroons (Yaounde); Taufflieb, 1962
Congo (Leopoldville); 3 females, 1 male; Taufflieb, 1962
Mus haussa
Nigeria; 2 coll. (5 females, 1 male); AMP
Mus minutoides
Ghana; 1 coll. (1 female); AMP
Ivory Coast; 1 coll. (1 female); AMP
Rhodesia; 3 coll. (18 females, 1 male); AMP
South Africa (ORS); 7 coll. (9 males); AMP
Mus musculoides
Congo (Brazzaville); 4 females (type specimens); Taufflieb, 1954
Ghana; 13 coll. (46 females, 16 males, 5 ny.); AMP
Ivory Coast; 23 coll. (62 females, 3 males, 53 ny.); AMP
Nigeria (Adu); 1 coll. (1 female); Keegan, 1962
Nigeria; Zumpt collection (AMP)
Upper Volta; 3 coll. (4 females); AMP
Mus setulosus
Ghana; 18 coll. (80 females, 6 males, 2 ny.); AMP
Ivory Coast; 23 coll. (127 females, 11 males, 10 ny.); AMP
Myomys daltoni
Ghana; Zumpt collection (AMP)
Praomys tullbergi
Ghana; 5 coll. (12 females, 7 males, 2 ny.); AMP
Ivory Coast; 1 coll. (1 female); AMP

Saccostomus campestris
South Africa (ORS); 1 coll. (1 female); AMP
Ictonyx striatus
South Africa (ORS); 1 coll. (1 female); AMP
Genetta villiersi
Ivory Coast; 1 coll. (2 females); AMP
Unknown
Botswana; 3 coll. (3 females, 2 males); AMP
Ghana; 1 coll. (10 females. 5 males, 8 ny.); AMP
Togo; 1 coll. (2 females); AMP

Remarks.— *L. lavieri* resembles *L. fritzumpti* in overall morphological characters but may be separated by the longer peritreme (extends anteriorly to middle or posterior of coxa I) and the presence of only one blunt, peglike preapical seta on tarsi II and III rather than two or more on each tarsi II-IV. This latter character may also be used to separate *L. lavieri* from *L. thamnomys*, as well as the overall body size; i.e., *L. thamnomys* is considerably larger (length of dorsal plate greater than 575 μ). Both *L. lavieri* and *L. fritzumpti* may be separated from *L. moucheti* by the longer dorsal setae as opposed to quite short dorsal setae in the latter, and by the presence of dorsal setae px 3 which is absent in *L. moucheti*. Also the medial hypostomal setae are distinctively longer than in *L. moucheti*.

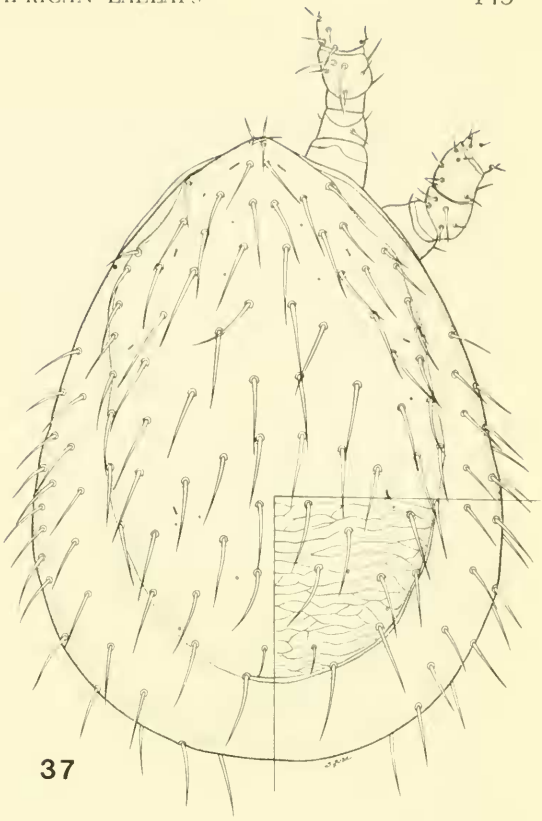
L. lavieri has been collected from many small mammal hosts throughout Africa, southern Africa as well as northwest Africa; however, it is parasitic primarily on species of *Mus*. More collections are recorded from this group of hosts than from all other small mammal hosts combined.

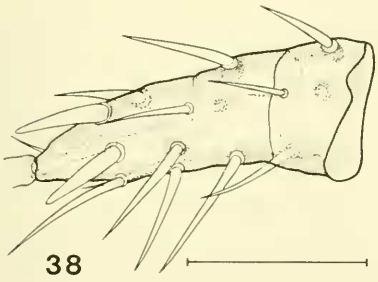
Laelaps (*Laelaps*) *fritzumpti* Taufflieb
Figs. 36-42

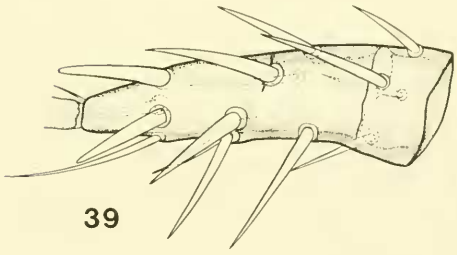
Laelaps fritzumpti Taufflieb, 1964, Z. f. Parasiten. 24:305-308 (Holotype: Nosob River, Kalahari, South Africa; South African Institute for Medical Research, Johannesburg).

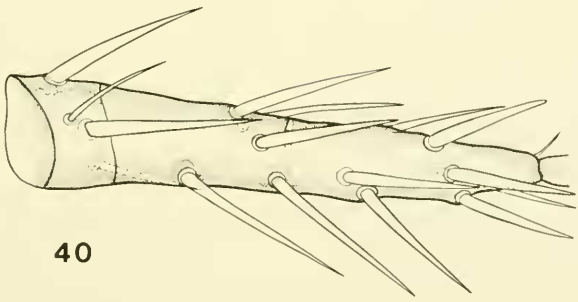
Description.— *Female*: (Figs. 36-40) Dorsal plate length 634 μ, width 417 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, not reaching to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination not reaching to level of 3rd sternal setae; setae st. 1 rather long, reaching to or almost to level of 3rd sternal setae but not to posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly if at all; distance between 1st genital setae subequal to distance between 4th genital setae, distance between 1st genital setae may be slightly less; distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roundly triangular, width equal to length, anterior margins straight; adanal setae rather long, extending distinctly beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing aproximately 10 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus approximately 6 pairs near or on posterior lateral body margins; metapodal plates elongate-oval. Petritreme extending anteriorly to level of middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching almost to posterior margin of dorsal plate. Fifteen to 20 pairs of setae bordering dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, with distal seta slightly shorter than proximal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike, posterior seta of coxa II somewhat more elongate than that of coxa III; tarsi II and III each with three rather robust, blunt preapical setae; tarsus IV with one or two longer blunt, preapical setae; all other leg setae setaceous and normally developed.

Male: (Figs. 41-42) Gnathosomal and hypostomal setae setaceous, with medial hypostomal setae of moderate length but not reaching to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long, each extending in length well beyond base of seta immediately posterior; holoventral plate rather narrow between coxae IV, and greatly expanded immediately posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively

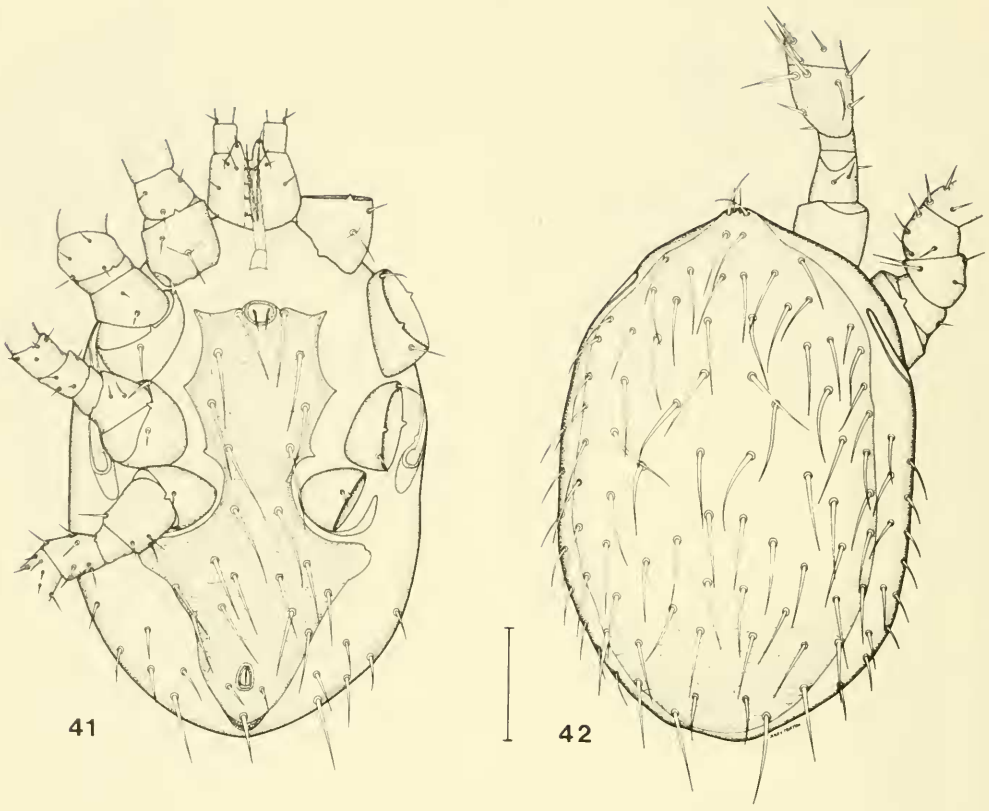








Figs. 36-40. *Laelaps fritzumpti* Taufflieb, female. (36) venter; (37) dorsum, scale = 100μ; (38) ventral view of tarsus II; (39) ventral view of tarsus III; (40) ventral view of tarsus IV, scale = 50μ.



Figs. 41-42. *Laelaps fritzumpti* Taufflieb, male. (41) venter; (42) dorsum. scale = 100μ.

short, reaching no further than base of postanal seta; postanal seta considerably longer than adanal setae and enlarged somewhat basally. Metapodal plates fused to lateral margins of holoventral plate posterior to coxae IV. Peritreme extends to level of middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae rather long, length considerably greater than distance between adjacent setae; subterminal setae (J5) somewhat longer than normal, extending distinctly beyond posterior margin of dorsal plate. Unarmed venter bearing 6 to 8 pairs of setae adjacent to holoventral plate. Soft integument of opisthosoma bearing 8 to 10 pairs of setae. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer than distal seta; setae ad 1 and pd 1 of femur I subequal in length, ad 1 seta slightly shorter; anterior seta of coxae I and II, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa III shorter and spinelike; tarsi II and III each with two or three spinelike preapical setae, one pair on each tarsi may be blunt; all other leg setae mostly setaceous and normally developed.

COLLECTION RECORDS

Elephantulus myurus
South Africa (ORS); 2 coll. (2 females); AMP
Elephantulus rupestris
South Africa (ORS); 10 coll. (11 females); AMP
Macroscelides proboscideus
South Africa, (ORS); 1 coll. (3 females); AMP
Desmodillus auricularis
South Africa (ORS); 8 coll. (12 females); AMP
Gerbillus paeba
South Africa (ORS); 31 coll. (54 females, 1 male); AMP
Tatera brandsi
South Africa (ORS); 2 coll. (2 females); AMP
Tatera leucogaster
South Africa (ORS); 4 coll. (16 females); AMP
Petromyscus collinus
South Africa; 1 coll. (1 female); AMP
South Africa (ORS); 7 coll. (7 females); AMP

Aethomys sp.
South Africa (Cape Province): 13 females; Tauffliеb, 1964
Aethomys chrysophilus
Rhodesia; 1 coll. (1 female); AMP
South Africa (ORS); 2 coll. (63 females, 1 male); AMP
Aethomys namaquensis
Botswana; 1 coll. (12 females); AMP
Botswana (northern); Tauffliеb, 1964
South Africa (ORS); 79 coll. (534 females, 2 males); AMP
South Africa (Transvaal); 2 females; Tauffliеb, 1964
Mastomys natalensis
South Africa (ORS); 3 coll. (3 females); AMP
Thallomys sp.
South Africa (Cape Province); 2 females; Tauffliеb, 1964
Thallomys paedulcus
South Africa (Cape Province); 17 females (type specimens); Tauffliеb, 1964
South Africa (ORS); 12 coll. (52 females); AMP
Rhabdomys pumilio
South Africa (ORS); 10 coll. (12 females); AMP
Saccostomus campestris
South Africa (ORS); 2 coll. (8 females); AMP
Otomys sp.
South Africa (Cape Province); 1 female; Tauffliеb, 1964
Otomys irroratus
South Africa (Orange); 1 female; Tauffliеb, 1964
Paratomys brandsi
South Africa (ORS); 1 coll. (1 female); AMP
Unknown
South Africa; 1 coll. (1 female); AMP
South Africa (ORS); 11 coll. (14 females); AMP

REMARKS.— *L. fritzumpti* may be distinguished from all other taxa of the subgroup by the three blunt, peglike preapical setae on tarsi II and III, and by the shorter peritreme (extends only to middle of coxa II). Several other diagnostic characters are the relatively large genital and anal plates, adanal setae almost as long as postanal seta, and rather long dorsal setae.

This species is very abundant on many small mammal hosts throughout southern Africa. It has been collected most frequently from *Aethomys* species, *Thallomys* species, *Rhabdomys pumilio*, *Gerbullus paeba*, and *Elephantulus rupestris*.

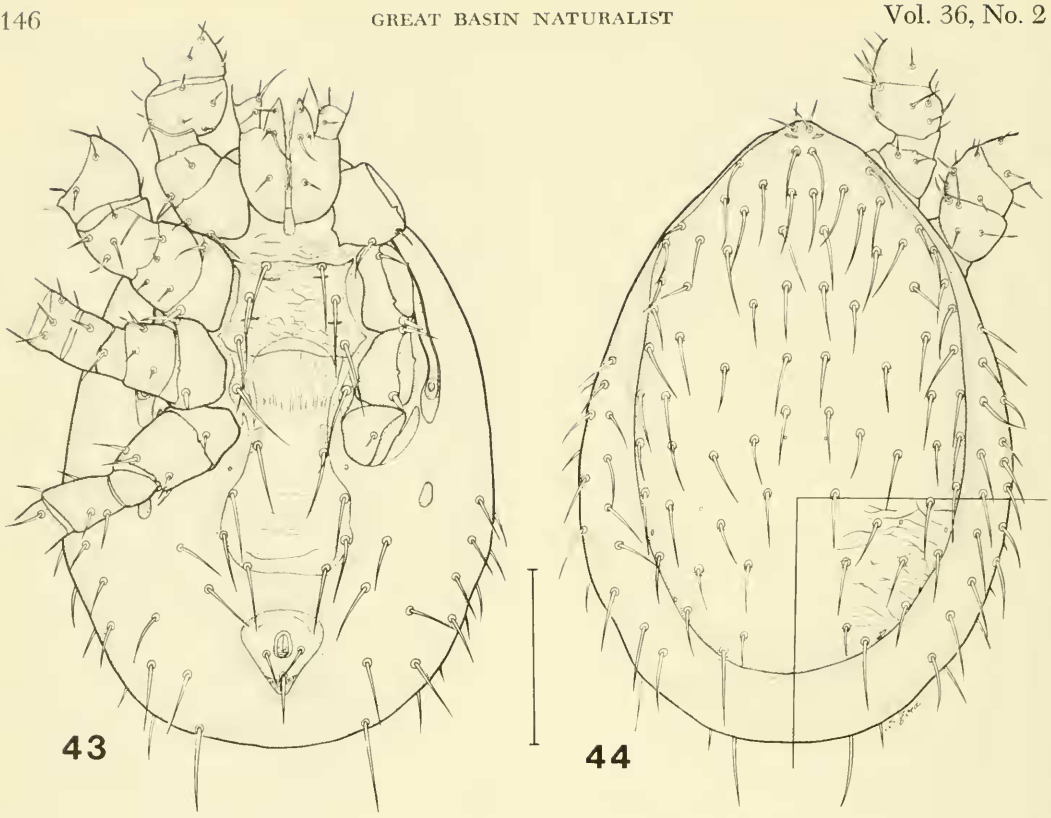
Laelaps (*Laelaps*) *thamnomys* Tauffliеb

Figs. 43-46

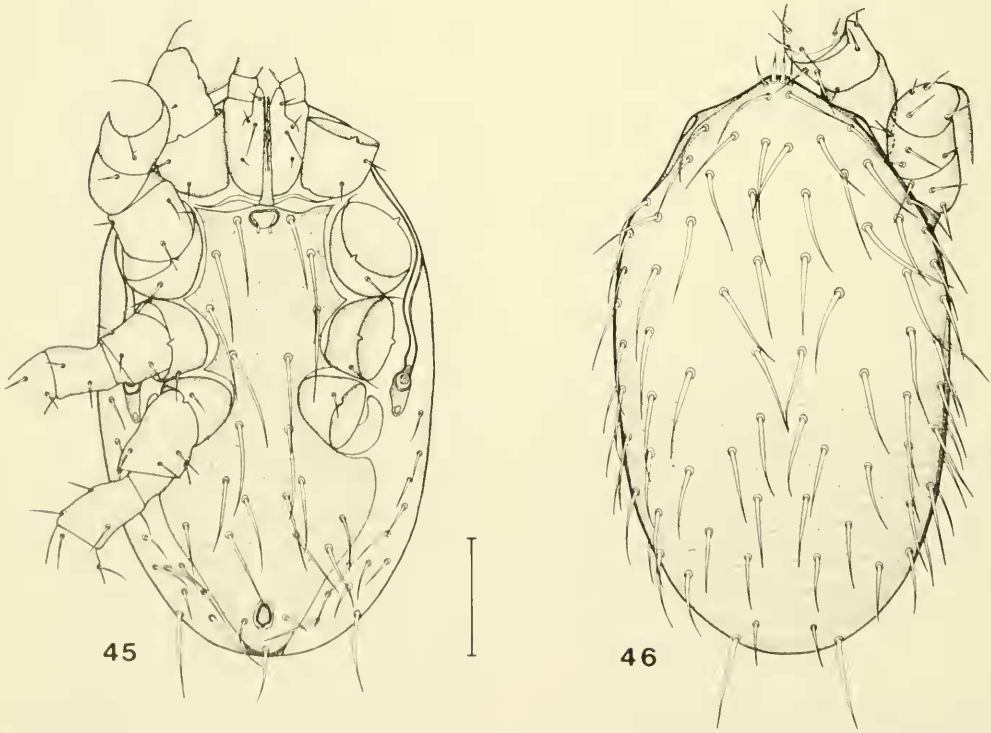
Laelaps thamnomys Tauffliеb, 1954, Ann. Parasit. 29(4):444-446 (Holotype: Brazzaville, Congo; Institut Pasteur, Paris); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6): 283.

DESCRIPTION.— *Female*: (Figs. 43-44) Dorsal plate length 599 μ, width 364 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length but not reaching to base of gnathosomal setae. Posterior margin of sternal plate only very slightly invaginated; setae st. 1 rather long, reaching almost to level of 3rd sternal setae. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae only slightly less than distance between 4th genital setae, distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roundly triangular, as wide as long, with anterior margins rounded; adanal setae of moderate length, extending slightly beyond base of postanal seta; adanal setae set near posterior end of anal orifice. Unarmed venter bearing approximately 10 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus approximately 6 pairs near or on posterior lateral body margins; metapodal plates oval, slightly longer than wide. Peritreme extends to level of middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length only slightly greater than distance between adjacent setae, if as long; subterminal setae (J5) reaching no further than posterior margin of dorsal plate. Twelve to 14 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; no blunt, robust preapical setae on tarsi II, III, or IV; however, some preapical setae may be spinelike; most other leg setae setaceous and normally developed.

Male: (Figs. 45-46) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long and slender, extending well beyond base of adjacent posterior



Figs. 43-44. *Laelaps thamnomys* Taufflieb, female. (43) venter; (44) dorsum. scale = 200μ.



Figs. 45-46. *Laelaps thamnomys* Taufflieb, male. (45) venter; (46) dorsum. scale = 100μ.

seta; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending to or slightly beyond base of postanal seta; adanal setae set at level slightly posterior to middle of anal orifice; postanal seta approximately twice as long as adanal setae, and somewhat more robust. Metapodal plates inapparent, apparently fused to lateral extension of holoventral plate; unarmed venter bearing approximately 12 to 14 pairs of setaceous setae adjacent to holoventral plate. Peritreme extending to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae, length and position of setae approximately as in female. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat more robust and longer than distal seta; setae ad 1 and pd 1 of femur I subequal in length, pd 1 seta slightly longer; anterior seta of coxae II and III and seta of coxa IV of moderate length and setaceous; posterior seta of coxa II of moderate length and rather robust, with posterior seta of coxa III short, robust, and spinelike; most leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

COLLECTION RECORDS

Mus musculoides
Togo; 1 coll. (1 female); AMP

Praomys tullbergi
Togo; 2 coll. (2 females); AMP

Thamnomys rutilans
Congo (Brazzaville); 6 females (type specimens); Taufflieb, 1954
Ivory Coast; 1 coll. (6 females); AMP
Togo; 8 coll. (66 females, 1 male, 1 ny.); AMP

REMARKS.— As noted previously, *L. thamnomys* differs from other taxa of subgroup B in the form of preapical setae on tarsi II and III, i.e., setaceous rather than blunt, peglike. Also, it is a rather large species with the dorsal plate exceeding 575 μ in length. In these two characters *L. thamnomys* is quite similar to *L. kampalensis*, which is placed in major group II, subgroup A, because of overall phenetic similarity. The former differs from the latter in the following characters: only slightly invaginated posterior margin of sternal plate, greatest width of genital plate at level of 3rd genital setae rather than at level of 2nd, and distance between 1st genital setae equal to or less than distance between 4th, rather than the reverse.

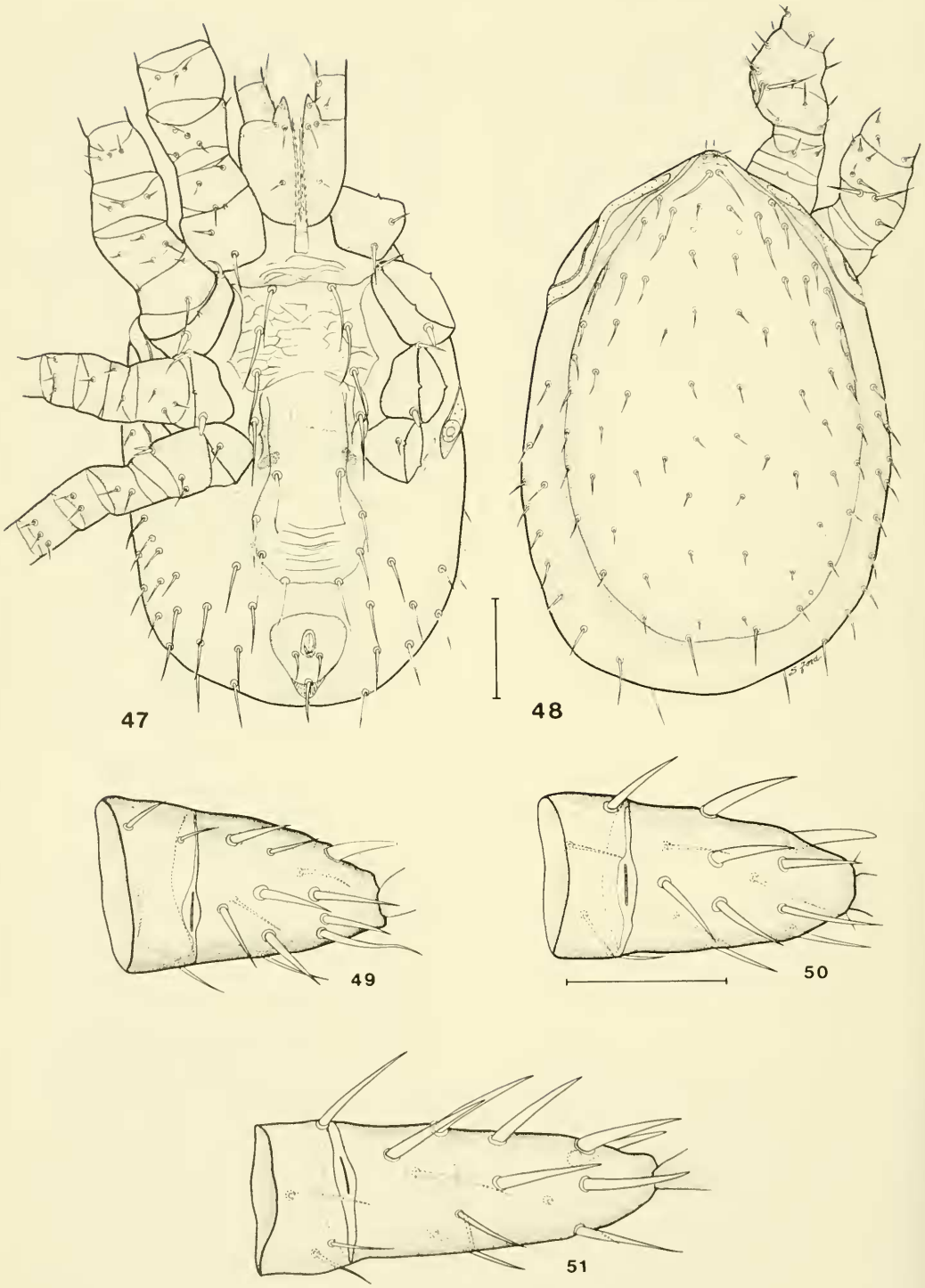
This taxa is recorded primarily from *Thamnomys rutilans* in northwest Africa south of the Sahara.

Laelaps (Laelaps) moucheti Taufflieb

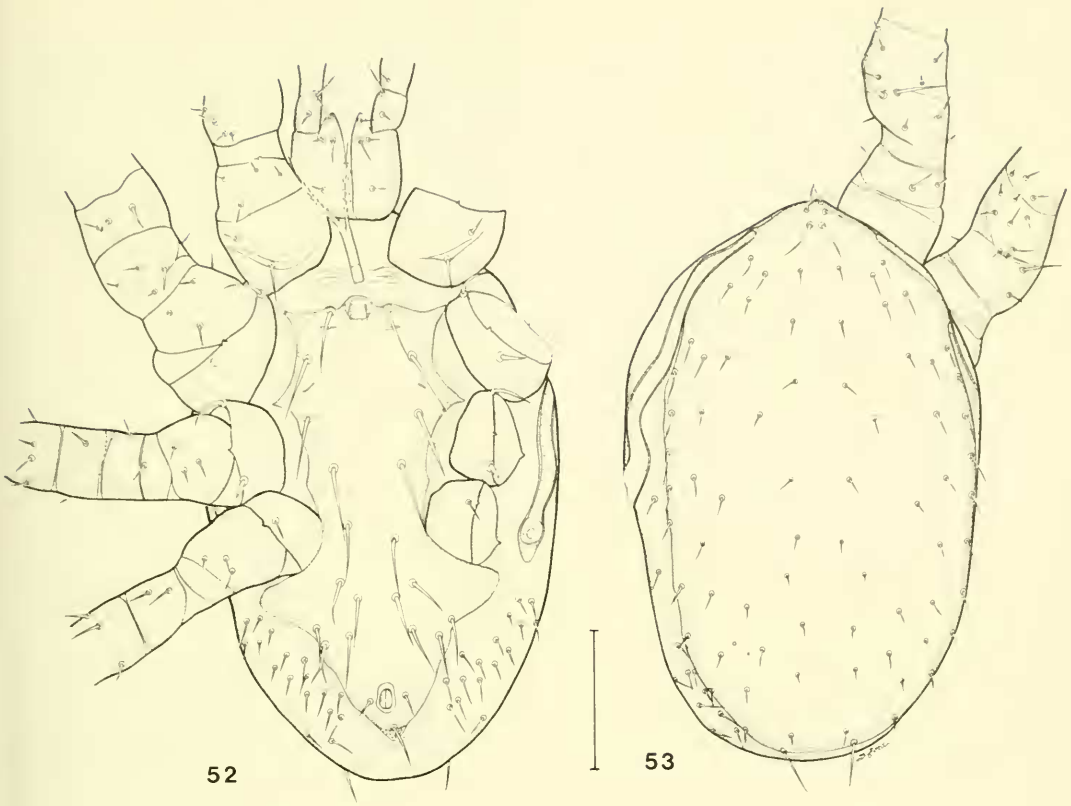
Figs. 47-53

Laelaps moucheti Taufflieb, 1959, J. Ent. Soc. So. Afr. 22(2):398-399 (Holotype: Yaounde, Cameroun; Museum d'Histoire Naturelle, Paris).

DESCRIPTION.— *Female*: (Figs. 47-51) Dorsal plate length 484 μ, width 302 μ. Gnathosomal and hypostomal setae setaceous. Medial hypostomal setae relatively short, reaching no more than half distance to gnathosomal setae. Posterior margin of sternal plate somewhat invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 of medium length, reaching to level halfway between 2nd and 3rd sternal setae. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae slightly greater than distance between 4th genital setae, distance between 2nd genital setae slightly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate roundly triangular, almost as wide as long, with anterior margins rounded; adanal setae of moderate length, extending to base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 14 to 16 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus approximately 10 to 12 pairs near or on posterior lateral body margin; metapodal plates oval to elongate-oval. Peritreme extends to level of middle of coxa I. Dorsal plate bearing 38 pairs of rather small setaceous setae, setae px3 absent; most dorsal setae relatively short, length no greater than half distance between adjacent setae; subterminal setae (J5) smaller than all others, and terminal setae (Z5) considerably longer than other adjacent setae. Ten to 12 pairs of setae border dorsal opisthosoma on soft integument. Both proximal and distal setae of



Figs. 47-51. *Laelaps moucheti* Taufflieb, female. (47) venter; (48) dorsum, scale = 100μ; (49) ventral view of tarsus II; (50) ventral view of tarsus III; (51) ventral view of tarsus IV, scale = 50μ.



Figs. 52-53. *Laelaps moucheti* Taufflieb, male. (52) venter; (53) dorsum, scale = 100μ.

coxa I setaceous, with proximal seta considerably longer than distal seta; setae ad 1 and pd 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III rather robust, blunt, and peglike; tarsi II and III each with one robust, blunt preapical setae; all other leg setae mostly setaceous and normally developed.

Male: (Figs. 52-53) Gnathosomal and hypostomal setae setaceous, medial hypostomal setae relatively short, not reaching more than half distance to gnathosomal setae. Ventral setae, except adanal and postanal setae, of moderate length, each extending in length somewhat beyond base of seta immediately posterior; holoventral plate rather broad between coxae II and III, rather narrow between coxae IV, and greatly expanded immediately posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, length not extending to base of postanal seta; adanal setae set near level of middle of anal orifice; postanal seta considerably longer than adanal setae. Metapodal plates inapparent, apparently fused with lateral extension of holoventral plate; unarmed venter bearing 16 to 18 rather small, slender setae. Peritreme extending to middle of coxa I. Dorsal plate bearing usual 39 pairs of setaceous setae; length and position of setae as in female. Soft integument of opisthosoma bearing 10 to 12 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, with proximal seta considerably longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV slender and setaceous; posterior seta of coxae II and III spinelike; no blunt preapical setae on tarsi II, III or IV; however, some preapical setae may be spinelike; most other leg setae setaceous and normally developed.

Collection records
"rodents"
Cameroon (Yaounde): 10 females (type specimens); Taufflieb, 1959

Remarks.— *L. moucheti* possesses several diagnostic characters which separate it from other taxa of subgroup B (major group I): unusually short dorsal setae, particularly posterocentrally; dorsal setae px3 absent, thus dorsal plate bears only 38 pairs of setae; medial hypostomal setae short, extending no further than half distance to gnathosomal setae.

This species is reported only from the "type" collection which is from "rodents" in Cameroon (Yaounde). It has not been found in any collections of the African Mammal Project to date.

Major Group II

This major group contains 14 taxa, as opposed to major group I which consists of 11 and major group III which has 6. With but two exceptions (*L. kampalensis* and *L. aethiopicus*), taxa of this major group are characterized by the presence of a blunt, peglike distal seta and a setaceous proximal seta on coxa I. *L. kampalensis* differs in having a setaceous distal seta on coxa I, and *L. aethiopicus* bears blunt, peglike setae both proximally and distally on coxa I. Both of these taxa are placed in this major group because of their overall phenetic similarity to taxa within this group.

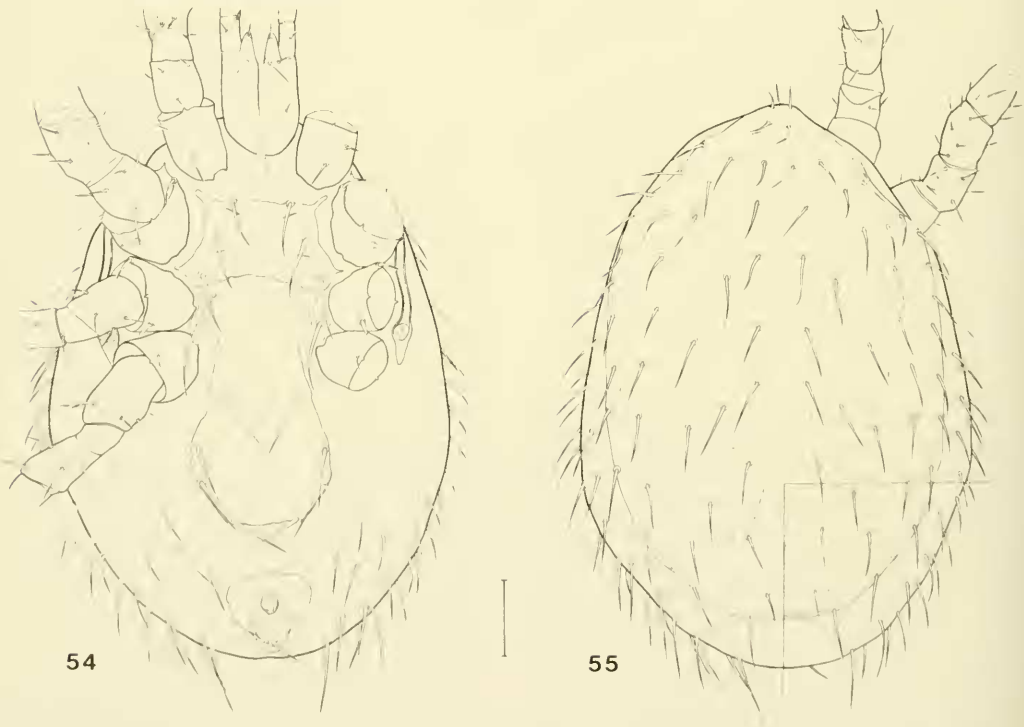
Subgroup A

The four species of this subgroup (*L. kampalensis*, *L. tillae*, *L. peregrinus*, and *L. roubaudi*) are characterized by tarsi II and III bearing setaceous preapical setae; no blunt, peglike setae are present on the tarsi of any of them. This is in contrast to all other taxa of major group II which bear at least one blunt, peglike preapical seta on tarsi II and III. As noted above, *L. kampalensis* differs from the other three species of this subgroup in having a setaecous distal seta on coxa I.

Laelaps (*Laelaps*) *kampalensis* Taufflieb

Figs. 54-55

Laelaps kampalensis Taufflieb, 1959, J. Ent. Soc. So. Afr. 22(2):402-403. (Holotype: Kampala, Uganda; Museum d'Histoire Naturelle, Paris).



Figs. 54-55. *Laelaps kampalensis* Taufflieb, female. (54) venter; (55) dorsum, scale = 100μ.

DESCRIPTION.— *Female*: (Figs. 54-55) Dorsal plate length 659 μ, width 445 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length but not reaching base of gnathosomal setae. Posterior margin of sternal plate invaginated to or slightly beyond level of setae st. 3; setae st. 1 of moderate length, reaching to point halfway between setae st. 2 and st. 3. Anterior flap of genital plate not overlapping posterior of sternal plate; distance between 1st genital setae distinctly greater than distance between 4th genital setae; greatest width of genital plate between 2nd and 3rd genital setae; distance between 2nd genital setae subequal to that between 3rd genital setae; posterior margin of genital plate between 4th pair of genital setae straight to slightly invaginated. Anal plate length subequal to width, anterior margin convex; adanal setae relatively long, extending well beyond base of postanal seta; adanal setae set near posterior end of anal orifice; postanal seta somewhat longer than adanal setae. Unarmed venter bearing about 14 pairs of setaceous setae, 8 pairs distinctly ventral adjacent to genital and anal plates, with other pairs more marginal; metapodal plates elongate-oval. Peritreme extends to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of moderate length, length equal to distance between adjacent setae; subterminal setae (J5) reaching to posterior margin of dorsal plate. Fourteen to 17 pairs of setae border dorsal plate on soft integument. Both proximal and distal setae of coxa I setaceous, with proximal seta slightly longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length, with ad 1 seta only slightly longer; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust and peglike; all leg setae setaceous; however, one or two preapical setae of tarsi II and III may be somewhat more robust than other setae.

Male: Unknown.

COLLECTION RECORDS

Lemniscomys striatus
Uganda; 8+ females (type specimens); Taufflieb, 1959
Unknown
Togo; 1 coll. (1 female); AMP

REMARKS.— In overall morphological characters *L. kampalensis* is most similar to *L. tillae;* however, it may be distinguished from the latter by the significantly larger size (dorsal plate greater than 575 μ long), and by the setaceous distal seta of coxa I rather than a small, blunt, peglike seta. In the above noted characters as well as certain others *L. kampalensis* is similar to *L. thamnomys;* yet it differs in the following notable characters: posterior margin of sternal plate distinctly more invaginated; greatest width of genital plate at level of 2nd genital setae rather than at 3rd; and distance between 1st genital setae distinctly greater than distance between 4th.

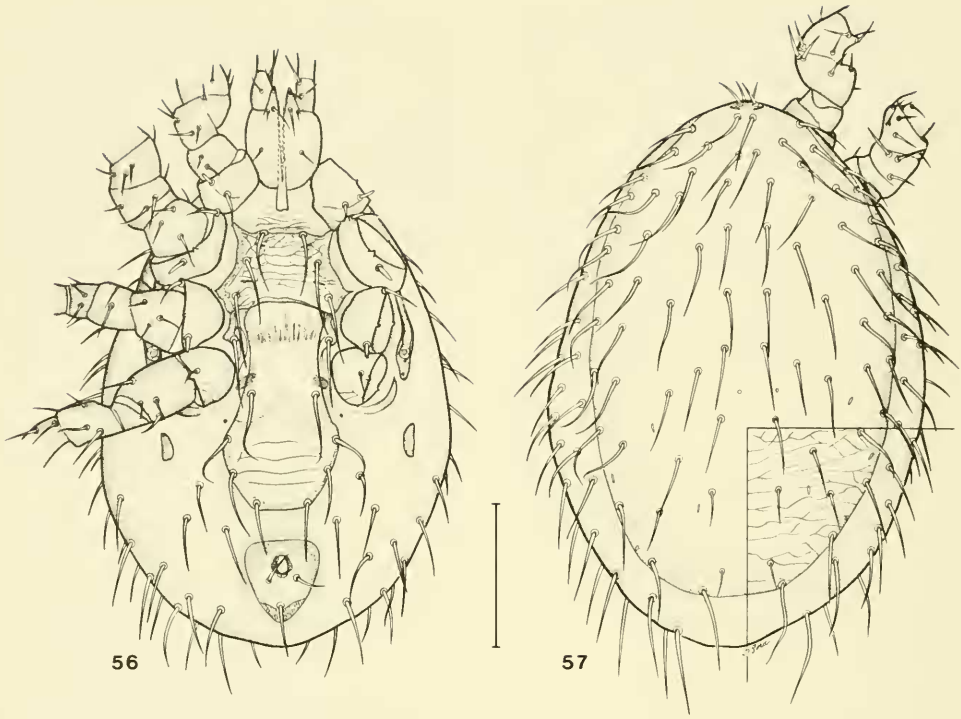
L. kampalensis is recorded from the type collection which is *Lemniscomys striatus* in Uganda, except for a single collection from an unknown host in Togo. Thus, at present very little is known of the actual host and geographic distribution of this species.

Laelaps (*Laelaps*) *tillae* Taufflieb

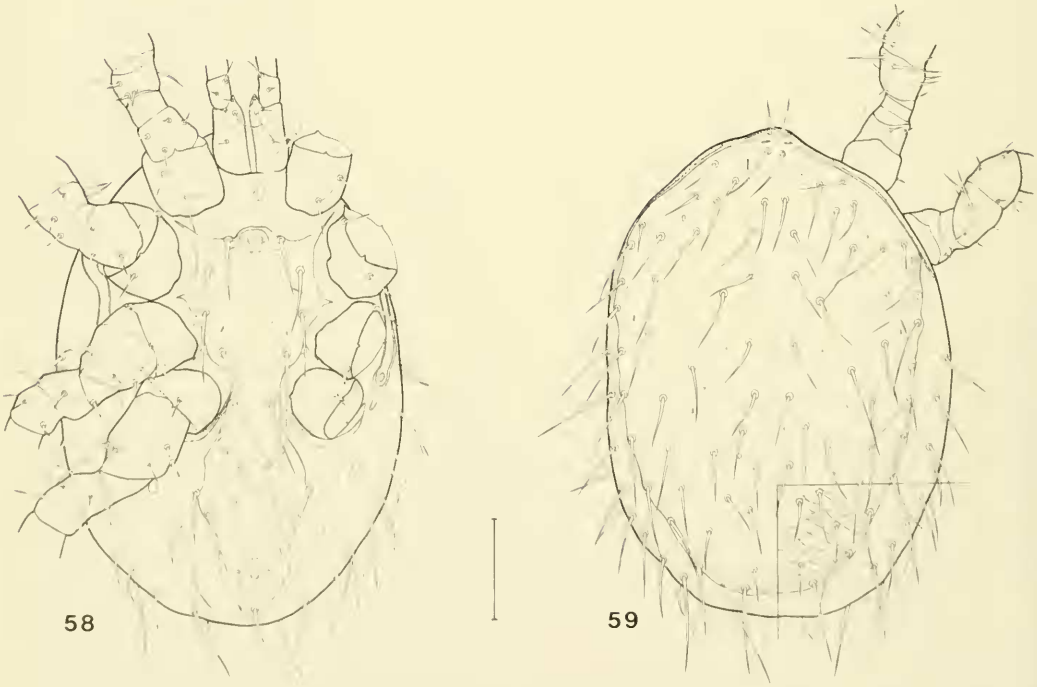
Figs. 56-59

Laelaps tillae Taufflieb, 1959, J. Ent. So. Afr. 22(2):403-404 (Holotype: Kruger National Park, Transvaal, South Africa; Museum d'Histoire Naturelle, Paris).

DESCRIPTION.—*Female*: (Figs. 56-57) Dorsal plate length 644 μ, width 416 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of medium length, reaching slightly further than half distance to gnathosomal setae. Posterior margin of sternal plate slightly invaginated; sternal setae st. 1 relatively long, reaching to or slightly beyond level of 3rd sternal setae, but not to posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae distinctly greater than distance between 4th genital setae, and distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate triangular in general shape, slightly longer than wide, with anterior margin straight; adanal setae of moderate length, extending to or slightly beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 10 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus ap-



Figs. 56-57. *Laelaps tillae* Taufflieb, female. (56) venter; (57) dorsum, scale = 200μ.



Figs. 58-59. *Laelaps tillae* Taufflieb, male. (58) venter; (59) dorsum scale = 100μ.

proximately 6 pairs near or on posterior lateral body margins. Metapodal plates rather elongate. Peritreme extends to level of middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length equal to or slightly greater than distance between adjacent setae; setae J4 somewhat shorter than adjacent anterior setae, and subterminal setae (J5) reaching no further than posterior margin of dorsal plate; terminal setae (Z5) approximately three times as long as subterminal setae. Twelve to 15 pairs of setae border dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous, distal seta rather small, blunt, and peglike; setae ad 1 and pd 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous, coxa IV seta somewhat smaller; posterior seta of coxae II and III rather robust, blunt, and peglike; no robust, blunt preapical setae on tarsi II, III, and IV; however, some preapical setae may be spinelike; most other leg setae setaceous and normally developed.

Male: (Figs. 58-59) Gnathosomal and hypostomal setae setaecous; medial hypostomal setae long and slender, extending to base of gnathosomal setae. Ventral setae, except adanals, rather long, each extending in length well beyond base of adjacent posterior setae; holoventral plate rather broad between coxae II and III, quite narrow between coxae IV, and moderately expanded posterior to coxae IV, but not greatly expanded as in some other species; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, extending no more than half distance between postanal seta; adanal setae set at level near middle of anal orifice; postanal seta considerably longer than adanals, and rather robust and spinelike. Metapodal plates elongate-oval, at least twice as long as wide; unarmed venter bearing approximately 10 pairs of setae, 2 immediately adjacent to holoventral plate and anal region plus about 8 pairs on posterior lateral body margins. Peritreme extending to middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position approximately as in female. Soft integument of opisthosoma bearing about 8 to 10 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, with proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length, with seta pd slightly longer; anterior seta of coxae II and III, posterior seta of coxae II, and seta of coxa IV setaceous, coxa IV seta somewhat shorter; posterior seta of coxa III rather short, robust, and spinelike; no robust, blunt peglike preapical setae on tarsi II, III, or IV; however, some preapical setae and other leg setae may be shorter and spinelike.

COLLECTION RECORDS

Aethomys chrysophilus
South Africa: 2 coll. (3 females); AMP

Lemniscomys sp.
South Africa (Transvaal): 7 females; Taufflieb, 1959

Lemniscomys griselda
Rhodesia; 1 coll. (1 female); AMP
South Africa; 1 coll. (1 female, 1 ny.); AMP
South Africa (Transvaal); 29 females; Taufflieb, 1959 and 1964

Mastomys natalensis
South Africa; 4 coll. (4 females, 4 males); AMP
South Africa (Transvaal); 22 females (type specimens); Taufflieb, 1959

Rhabdomys pumilio
South Africa; 1 coll. (1 female); AMP

Saccostomus campestris
Rhodesia; 1 coll. (1 female); AMP

Unknown
South Africa (ORS); 1 coll. (1 female); AMP

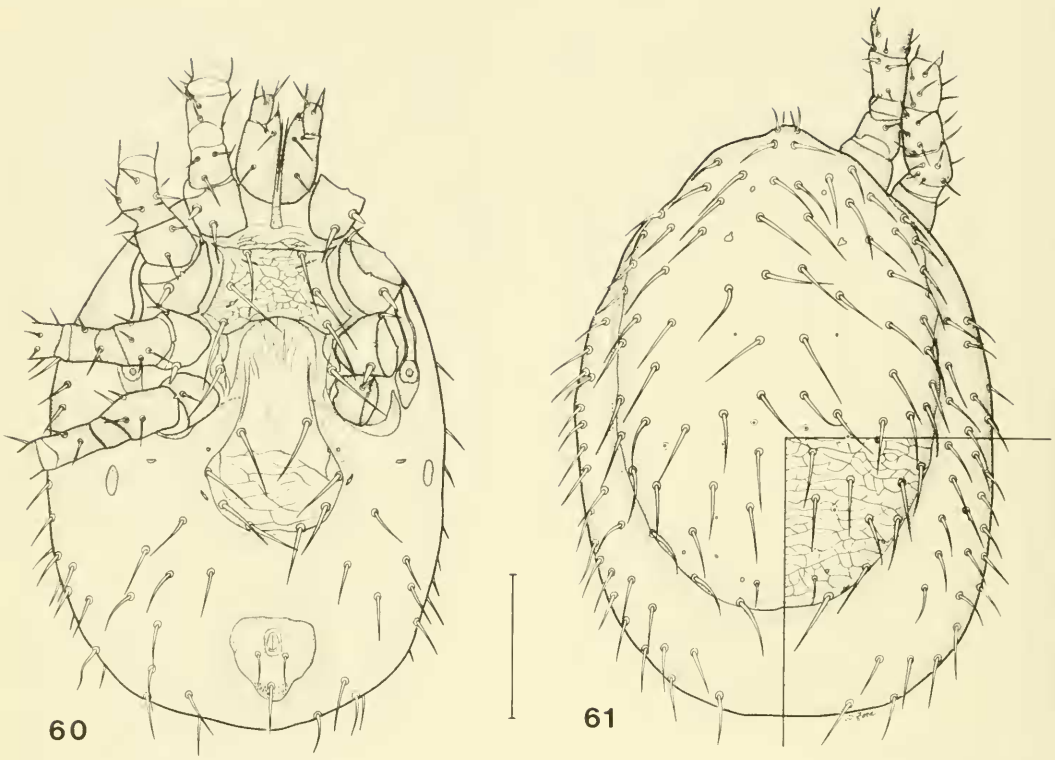
REMARKS.— As noted previously, *L. tillae* is phenetically quite similar to *L. kampalensis* in overall morphological characters but differs primarily in the smaller size (dorsal plate less than 575 μ long) and in the presence of a small, blunt, peglike seta distally on coxa I. *L. tillae* differs from the other two taxa of subgroup A by the smaller, more slender peglike distal seta of coxa I, the more slender, setaceous proximal seta of coxa I, and the slight invagination of the posterior margin of the sternal plate.

L. tillae has been collected only from southern Africa on a half dozen different hosts; however, it is reported most frequently from *Mastomys natalensis* and *Lemniscomys* species.

Laelaps (*Laelaps*) *peregrinus* Taufflieb

Figs. 60-61

Laelaps peregrinus Taufflieb, 1959, J. Ent. So. Afr. 22(2):401-402 (Holotype: Pilgrims Rest, Transvaal, South Africa: Museum d'Histoire



Figs. 60-61. *Laelaps peregrinus* Taufflieb, female. (60) venter; (61) dorsum. scale = 200μ.

Naturelle de Paris): Taufflieb, 1964, Z. f. Parasiten 24:307.

Description.— *Female*: (Figs. 60-61) Dorsal plate length 653 μ, width 438 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, but not reaching to base of gnathosomal setae. Posterior margin of sternal plate invaginated slightly beyond level of seta st. 3; setae st. 1 rather long, reaching almost to posterior margin of sternal plate. Anterior flap of genital plate rather narrow and not overlapping posterior of sternal plate; distance between 1st genital setae much greater than distance between 4th genital setae; distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate slightly wider than long; adanal setae of moderate length, extending to base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta considerably larger than adanal setae. Unarmed venter bearing about 17 pairs of setaceous setae, 6 to 10 pairs distinctly ventral with others more marginal; metapodal plates elongate-oval. Peritreme extending to middle or posterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most setae of moderate length, length equal to distance between adjacent setae; subterminal setae (J5) reaching slightly beyond posterior margin of dorsal plate; approximately 20 setae bordering dorsal opisthosomal on soft integument. Proximal seta of coxa I setaceous but somewhat robust, distal seta usually blunt, peglike (may be robust and spinelike), and about half the length of proximal seta; setae pd 1 and ad 1 of femur I subequal in length, with ad 1 only slightly longer; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III bluntly spinelike; all leg setae setaceous; however, some preapical setae of tarsi may be somewhat robust.

Male: Unknown.

Collection records

Aethomys chrysophilus

South Africa; 1 coll. (1 female); AMP

Rhabdomys pumilio
South Africa (Transvaal); 1 female (type specimen); Taufflieb, 1959
South Africa (Cape Prov.); 1 female; Taufflieb, 1964
South Africa; 1 coll. (1 female); AMP
South Africa (Somerset East, Cape Prov.); 1 coll. (1 female); AMP
Otomys sp.
South Africa (Transvaal); 1 female; Taufflieb, 1959

REMARKS.— *L. peregrinus* and *L. roubaudi* are quite similar to each other, both differing from *L. tillae* in the much more robust setae of coxa I, and in the deeper invagination of the posterior margin of the sternal plate. *L. peregrinus* may be distinguished from *L. roubaudi* by the following key characters: genital plate distinctly more expanded posteriorly with greatest width at level of 2nd genital setae; peritreme extends anteriorly only to level of middle of coxa II; and larger idiosoma, dorsal plate length greater than 600 μ.

L. peregrinus has been collected to date only from the country of South Africa, almost exclusively from *Rhabdomys pumilio*.

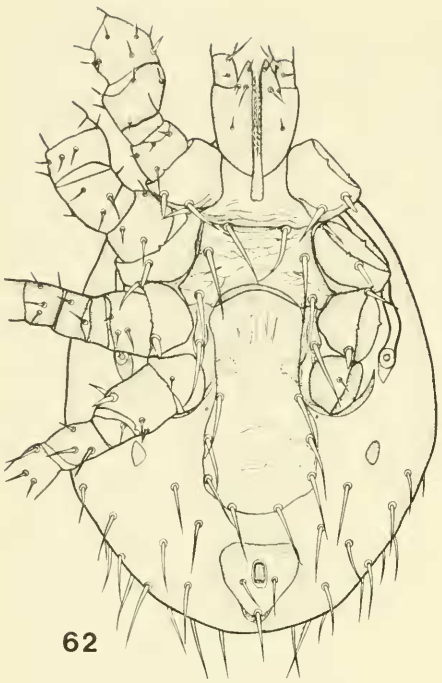
Laelaps (*Laelaps*) *roubaudi* Taufflieb

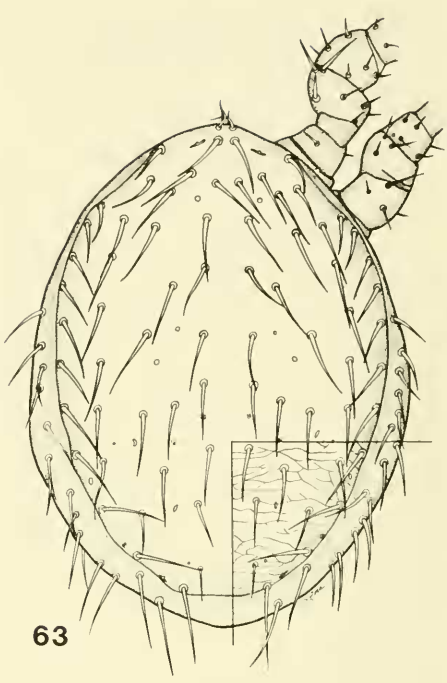
Figs. 62-65

Laelaps roubaudi Taufflieb, 1954, Ann. Parasit. 29(4):437 (Holotype: Brazzaville, Congo; Institut Pasteur, Paris); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):281.

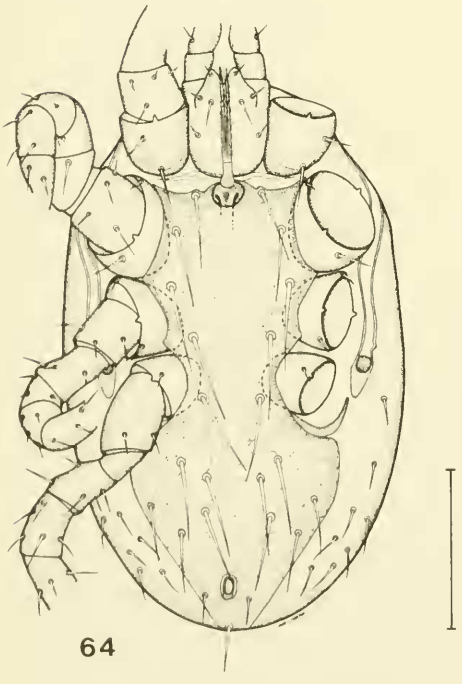
DESCRIPTION.— *Female*: (Figs. 62-63) Dorsal plate length 523 μ, width 374 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of medium length, reaching slightly more than half distance to base of gnathosomal setae. Posterior margin of sternal plate moderately invaginated, invagination reaching to or slightly beyond level of 3rd sternal setae; setae st. 1 relatively long, reaching to or almost to level of 3rd sternal setae. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae considerably greater than distance between 4th genital setae, and distance between 2nd genital setae subequal to distance between 3rd; greatest width of genital plate at or between 2nd and 3rd genital setae. Anal plate triangular in general shape, about as wide as long, with anterior margin straight to slightly concave or invaginated; adanal setae relatively long, extending beyond base of postanal seta; adanal setae set at level near posterior one-third of anal orifice. Unarmed venter bearing 7 or 8 pairs of setaceous setae, 4 pairs immediately adjacent to genital and anal plates plus 4 or 5 pairs near or on posterior lateral body margins; metapodal plates irregularly oval, slightly longer than wide. Peritreme extending to level of middle or anterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching slightly beyond posterior margin of dorsal plate. Fourteen to 16 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I of medium length, robust, and spinelike, distal seta of coxa I short, robust, and peglike; setae ad 1 and pd 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous, with coxa IV seta rather small; posterior seta of coxa II blunt, peglike but longer, posterior seta of coxa III short, robust, and peglike; one preapical seta of each tarsi II and III spinelike; most other setae setaceous and normally developed.

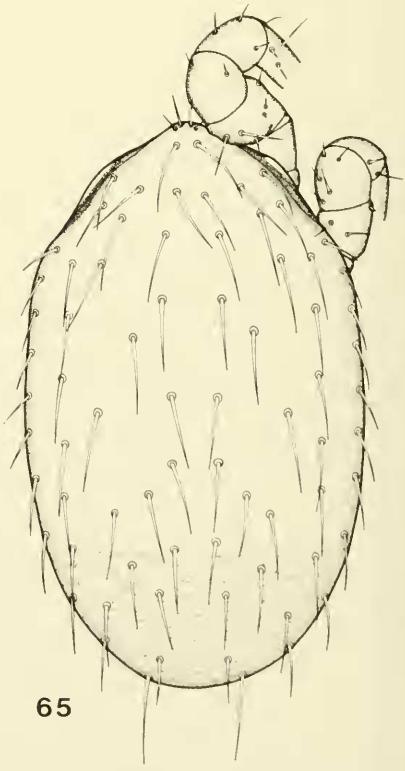
Male: (Figs. 64-65) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long and slender, extending well beyond base of adjacent posterior setae; holoventral plate very broad between coxae II and III, narrowing between coxae IV, and expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending to or slightly beyond base of postanal seta; adanal setae set at level near posterior of anal orifice; postanal seta somewhat longer and considerably more robust than adanal setae. Metapodal plates inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing approximately 8 to 10 pairs of setaceous setae adjacent to holoventral plate, marginal seta longer. Peritreme extending to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position approximately





Figs. 62-63. *Laelaps roubaudi* Taufflieb, female. (62) venter; (63) dorsum, scale = 100μ.





Figs. 64-65. *Laelaps roubaudi* Taufflieb, male. (64) venter; (65) dorsum, scale = 100μ.

as in female. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer and more robust than distal seta; setae ad 1 and pd 1 of femur I subequal and medium in length; anterior seta of coxae II and III, posterior seta of coxa II and seta of coxa IV setaceous; posterior seta of coxa III short, robust, and spinelike; several preapical setae of tarsi II and III somewhat robust and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

COLLECTION RECORDS

Crocidura sp.
Nigeria; 1 coll. (1 female); AMP
Tatera kempi
Dahomey; 1 coll. (4 females); AMP
Ivory Coast; 2 coll. (3 females, 3 males); AMP
Taterillus nigeriae
Nigeria (northern); 1+ coll. (1+ female); AMP
Dasymys foxi
Nigeria; 2 coll. (4 females); AMP
Dasymys incomptus
Congo (Brazzaville); 11 females (type specimens); Taufflieb, 1954
Ivory Coast; 8 coll. (20 females, 6 ny.); AMP
Lophuromys sikapusi
Congo (Brazzaville); Taufflieb, 1962
Pelomys sp.
Congo (Brazzaville); Taufflieb, 1962
Praomys tullbergi
Ghana; 1 coll. (1 female); AMP

REMARKS.— As noted previously, *L. roubaudi* is most similar to *L. peregrinus* but differs in being a smaller species (length of dorsal plate less than 600 μ). Also, the peritreme extends distinctly further anteriorly (to level of middle of coxa I), and the distance between 2nd genital setae is no greater than that between 3rd. It may be separated from *L. tillae* by the more robust setae on coxa I and the deeper invagination of the posterior margin of the sternal plate.

L. roubaudi has been collected from a variety of different hosts in northwest Africa south of the Sahara. More specimens have been collected from *Dasymys incomptus* than from any other host, but the number of collections from any one host species is not sufficient to draw accurate conclusions on host-parasitic relationships.

Subgroup B

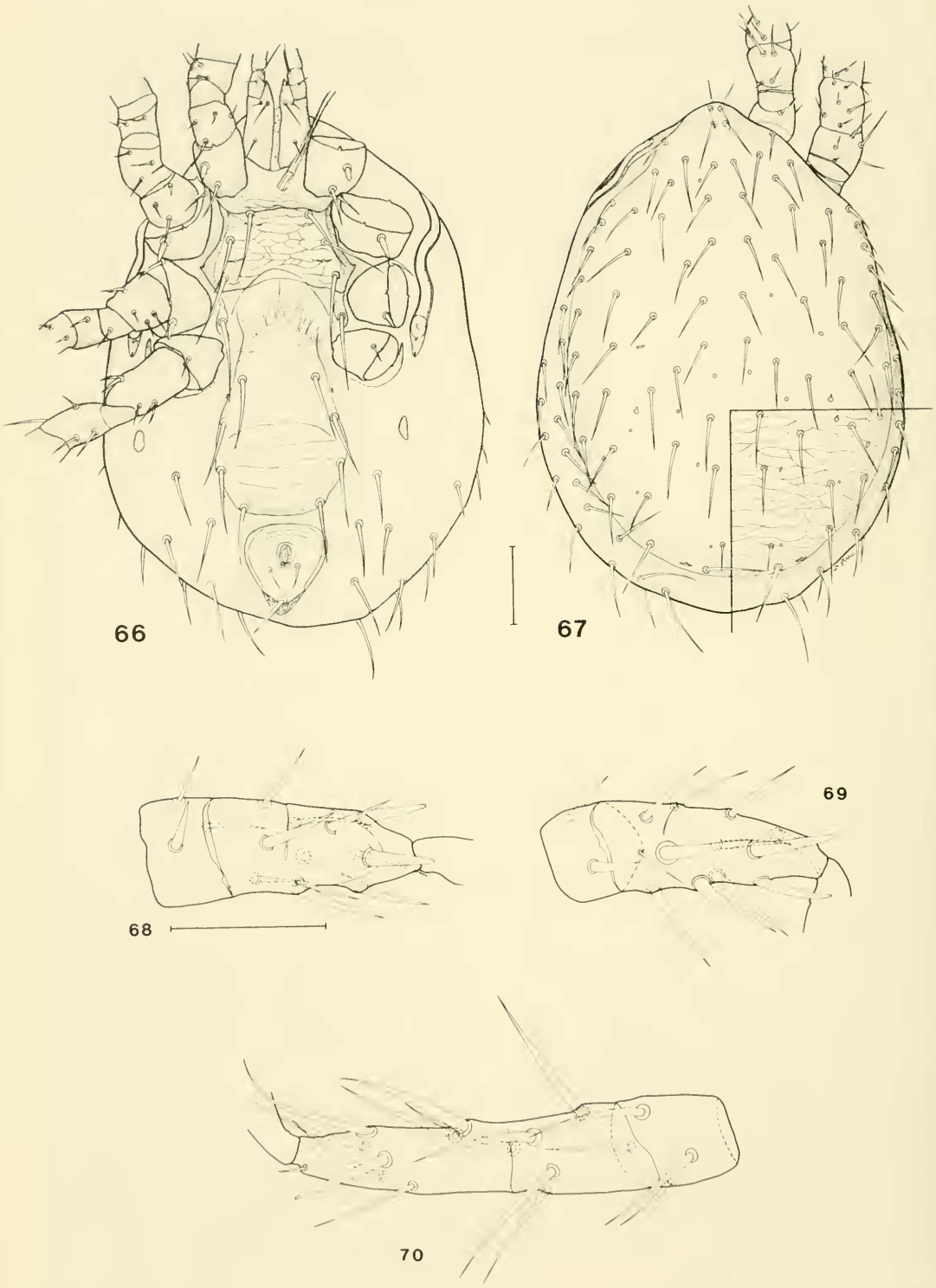
The formation of this subgroup is based primarily on the numerical taxonomic results. The 5 taxa of this subgroup differ from subgroup A by the presence of one or more blunt, peglike setae apically on tarsi II and III, but there is no set of key characters which easily distinguishes this subgroup from subgroup C. As noted previously, *L. aethiopicus* differs from the other taxa of this subgroup in bearing blunt, peglike setae both proximally and distally on coxa I; however, it is phenetically similar to the taxa of this subgroup in overall similarity.

Laelaps (*Laelaps*) *nuttalli* Hirst

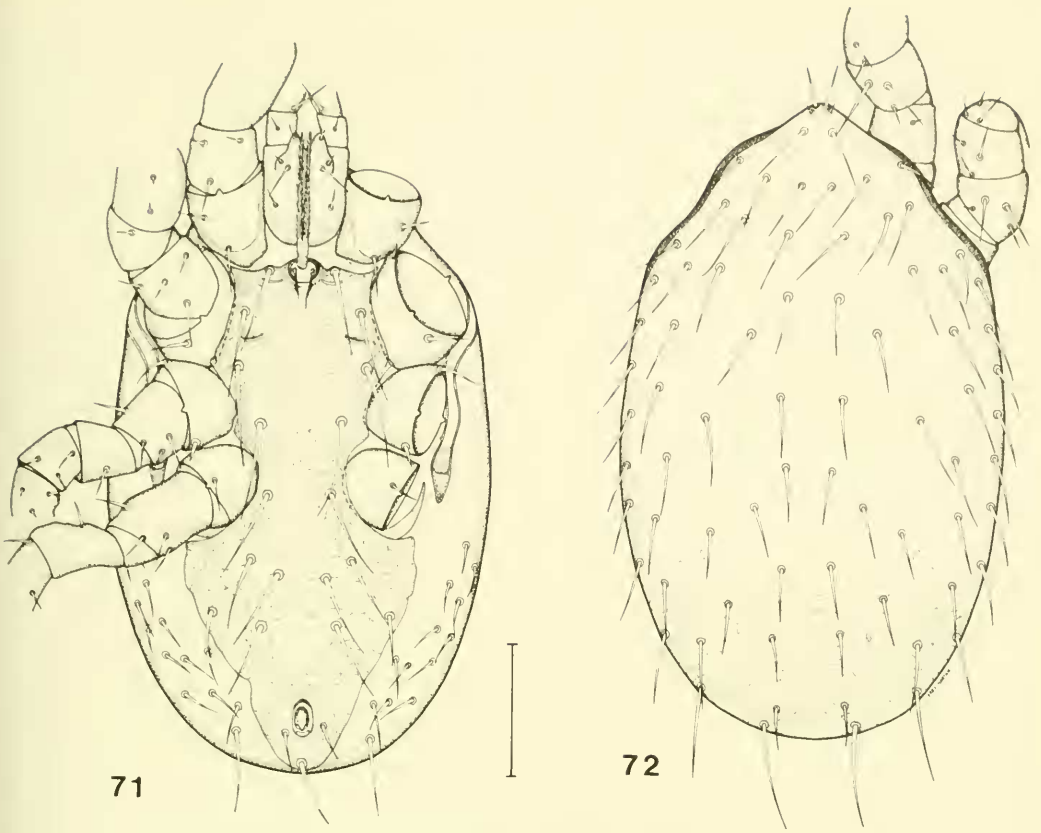
Figs. 66-72

Laelaps nuttalli Hirst, 1915, Bull. Ent. Res. 6: 183 (Holotype: Colombo, Ceylon; British Museum [Natural History], London); Zumpt, 1950, S. Afr. J. Med. Sci. 15:87; Keegan, 1956, J. Egypt. Publ. Hlth. Assoc. 31:262; Zumpt and Till, 1958, J. Ent. Soc. So. Afr. 21:266; Taufflieb, 1959, J. Ent. Soc. So. Afr. 22:406; Tipton, 1960, Univ. Calif. Publ. Ent. 16:278; Coffee, 1971, Zeitsch. Angew. Zool. 58:43-52.

DESCRIPTION.— *Female*: (Figs. 66-70) Dorsal plate length 621 μ, width 423 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae relatively long, not reaching to base of gnathosomal setae. Posterior margin of sternal plate only slightly invaginated; setae st. 1 relatively long, reaching almost to posterior margin of sternal plate. Anterior flap of genital plate slightly overlapping posterior of sternal plate; distance between 1st genital setae and 4th genital setae approximately equal; greatest width of genital plate at or slightly anterior to 3rd pair of genital setae. Anal plate roundly triangular, anterior margin somewhat rounded, width approximately equal to length; adanal setae of medium length, less than distance to postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing about 12 pairs of setaceous setae, 5 pairs adjacent to genital and anal plates plus about 7 pairs near or on posterior lateral body margins; metapodal plates elongate oval. Peritreme extending to or nearly to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length almost equal to distance between adjacent setae; subterminal setae (J5) reaching almost to posterior margin of dorsal plate. Ten to 12 pairs of setae bordering dorsal opistho-



Figs. 66-70. *Laelaps nuttalli* Hirst, female. (66) venter; (67) dorsum, scale = 100μ; (68) ventral view of tarsus II; (69) ventral view of tarsus III; (70) ventral view of tarsus IV, scale = 50μ.



Figs. 71-72. *Laelaps nuttalli* Hirst, male. (71) venter; (72) dorsum. scale 100μ.

soma on soft integument. Proximal seta of coxa I setaceous and of medium length, distal seta relatively short, blunt, and peglike; setae pd 1 and ad 1 of femur I subequal in length, with ad 1 seta only slightly longer; anterior seta of coxae I and II and seta of coxa IV setaceous. Posterior seta of coxae II and III robust and peglike; tarsi II and III each with two blunt, preapical setae, and tarsus IV with one blunt, preapical setae; all other leg setae setaceous and normally developed.

Male: (Figs. 71-72) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length reaching to base of gnathosomal setae. Ventral setae, except adanal setae, rather long and slender, each extending well beyond base of posterior seta; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bears 5 pairs of setaceous setae; adanal setae of medium length, extending slightly beyond base of postanal seta; adanal setae set at level near posterior end of anal orifice; posterior seta approximately twice as long as adanals and usually slightly more robust. Metapodal plates inapparent, apparently fused to lateral extension of holoventral plate; unarmed venter bearing approximately 12 to 14 pairs of setaceous setae adjacent to holoventral plate, those closer to holoventral plate rather short, with those on margins quite long. Peritreme extends to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae approximately as in female. Both proximal and distal setae of coxa I setaceous, proximal seta slightly longer and more robust than distal seta; setae pd 1 and ad 1 of femur I subequal in length, pd 1 seta slightly longer; anterior seta of coxae II and III, and posterior seta of coxa IV mostly setaceous but somewhat robust basally; posterior seta of coxa III short,

quite robust, and spinelike to peglike; several preapical setae of tarsi II and III rather robust and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and somewhat spinelike.

Collection records
Rattus rattus
Belgian Congo (Elizabethville); Zumpt, 1961
Madagascar; 1 female; Zumpt, 1961, and Coffey, 1971
Madagascar; 4 coll. (65 females, 2 males); AMP
Mauritius; 4 coll. (12 females); AMP
Mastomys coucha
South Africa; Tipton, 1960

Remarks.— *L. nuttalli* and *L. aethiopicus* may be easily distinguished from the other taxa of subgroup B by the longer peritreme which extends anteriorly to near middle of coxa I. These two taxa also differ from the taxa of subgroup C, except for *L. myomys*, in the same character. *L. nuttalli* and *L. myomys* may be separated from *L. aethiopicus* in that the proximal seta of coxa I is setaceous rather than blunt and peglike. *L. nuttalli* bears smaller setaceous gnathosomal setae, setaceous ventral leg setae, and moderate-length adanal setae rather than robust, spinelike, or peglike ventral leg setae and short adanal setae as in *L. myomys*.

L. nuttalli is reported almost exclusively from *Rattus rattus* in the Ethiopian region. All collections of the African Mammal Project were from this host in Madagascar and Mauritius. *L. nuttalli* is a rather cosmopolitan mite, occurring worldwide wherever *Rattus* species are found.

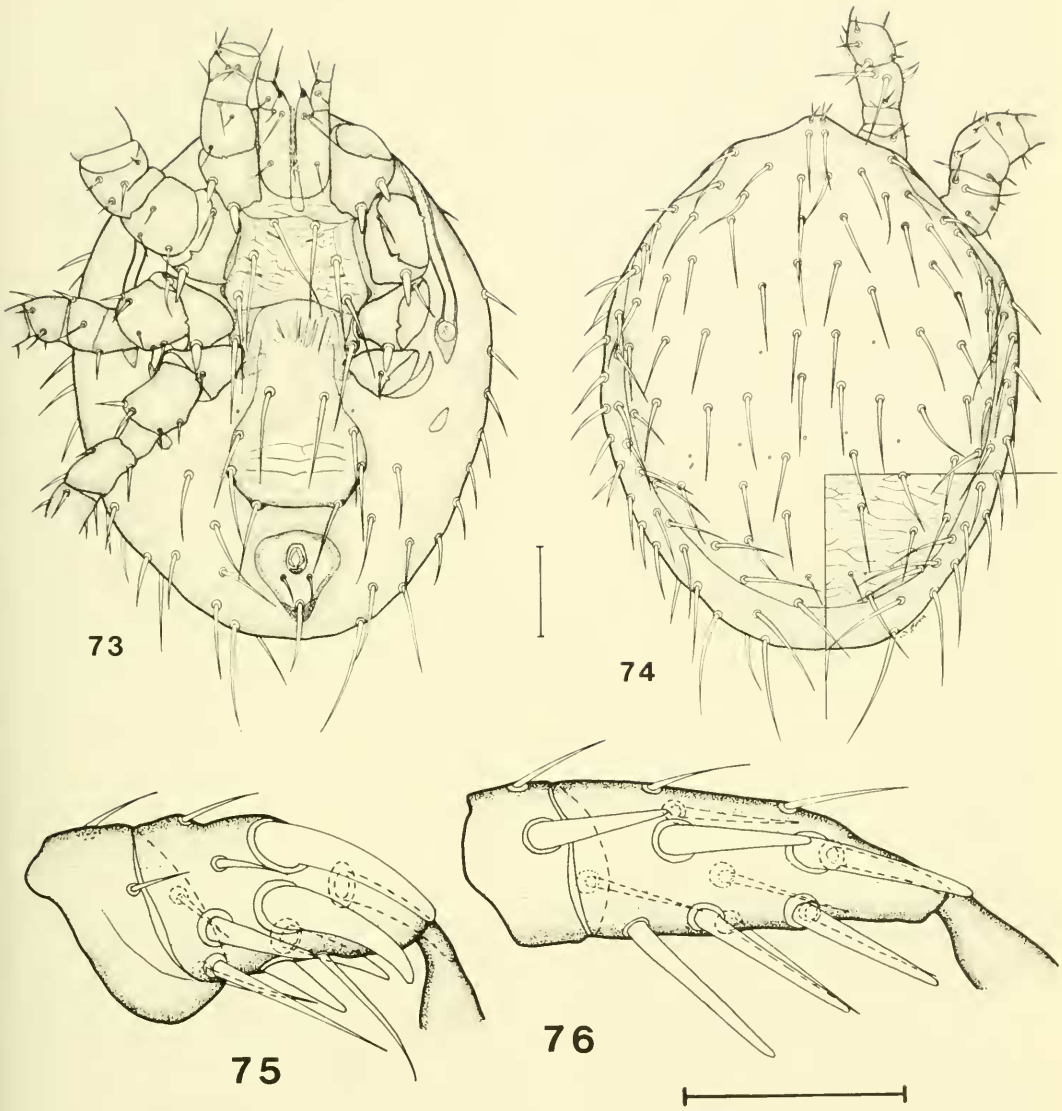
Laelaps (*Laelaps*) *aethiopicus* Hirst
Figs. 73-76

Laelaps aethiopicus Hirst, 1925, Proc. Zool. Soc Lond. 4:56 (Holotype: Ashundwa's Camp, Wanga, Kenya; British Museum [Natural History], London); Zumpt, 1950, So. Afr. J. Med. Soc. 15:78; Radford, 1950, Parasitology 40 (3-4):368; Keegan, 1956, Egypt. Publ. Hlth. Assoc. 31(6):258.

Description.— *Female*: (Figs. 73-76) Dorsal plate length 672 μ, width 501 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching almost to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 long, reaching beyond posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae distinctly less than distance between 4th genital setae, and distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roundly triangular, almost as wide as long, with anterior margins rounded; adanal setae of moderate length, extending to or slightly beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 12 pairs of setaceous setae, 4 pairs adjacent to genital and anal plate plus approximately 6 pairs near or on posterior lateral body margins; metapodal plates elongate-oval. Peritreme extending to level of middle or at least posterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching to or slightly beyond posterior margin of dorsal plate. Eighteen to 20 pairs of setae bordering dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I robust, blunt, and peglike, with distal seta slightly shorter than proximal seta; setae pd 1 of femur I slightly longer than ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; tarsus II with four or five robust, blunt preapical setae, tarsus III with three or four blunt, robust preapical setae, and tarsus IV with two blunt preapical setae; all other leg setae setaceous and normally developed.

Collection records
"Rats"
Kenya (Ashundwa's Camp, Wanga); Hirst, 1925

Remarks.— *L. aethiopicus* is easily distinguished from other taxa of subgroup B as well as all others of major group II by the robust, peglike proximal seta of coxa I. Based upon this one character alone, this mite would be placed in major group III with *L. vansomereni;* however, in overall morphological characters it most closely resembles *L. nuttalli*. *L.*



Figs. 73-76. *Laelaps aethiopicus* Hirst, female. (73) venter; (74) dorsum, scale = 100μ; (75) ventral view of tarsus II; (76) ventral view of tarsus III, scale = 50μ.

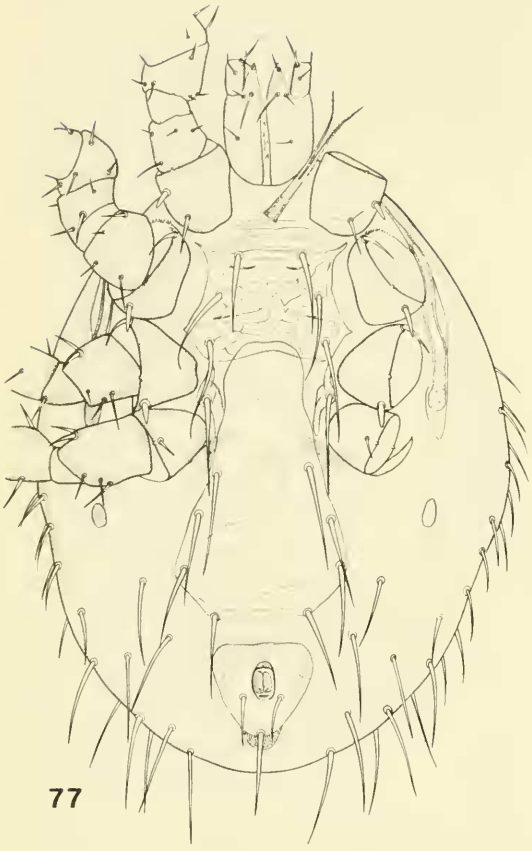
aethiopicus differs from taxa of major group III by the following characters: gnathosomal setae setaceous, never robust and spinelike or peglike; 1st sternal setae long, extending beyond posterior margin of sternal plate; and adanal setae slender and setaceous, not robust and spinelike.

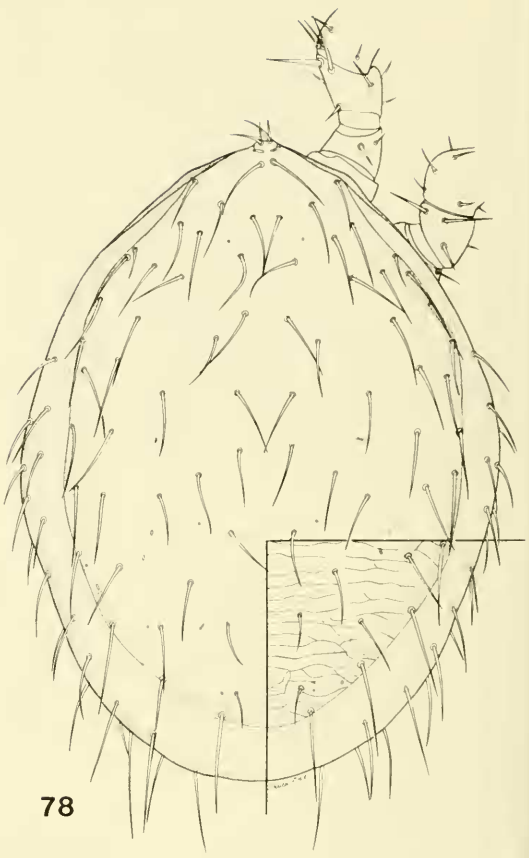
L. aethiopicus is known only from the type collection which is reported by Hirst (1925) from Kenya on "Rats." No specimens have yet been recovered from the African Mammal Project collections.

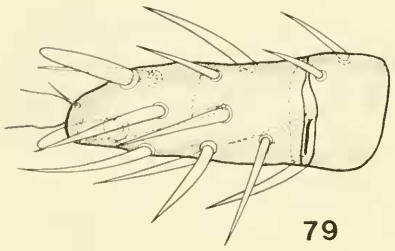
Laelaps (*Laelaps*) *liberiensis* Hirst

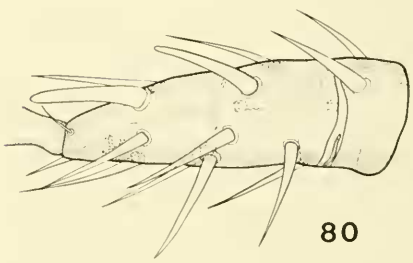
Figs. 77-83

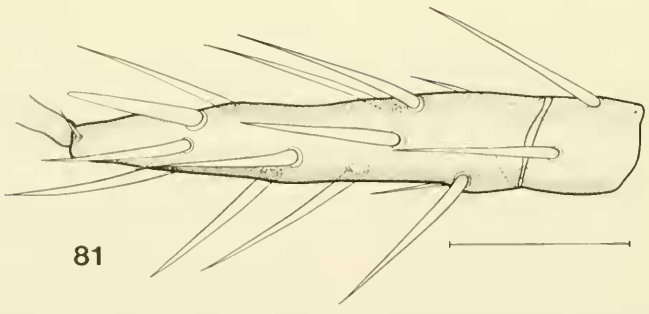
Laelaps liberiensis Hirst, 1925, Proc. Zool. Soc. Lond. 4:68 (Holotype: Gonyon Country, Liberia; British Museum [Natural History], London); Keegan, 1956, J. Egypt. Publ. Hlth. Assoc. 31:261; Zumpt and Till, 1958, J. Ent.











Figs. 77-81. *Laelaps liberiensis* Hirst, female. (77) venter; (78) dorsum, scale = 100μ; (79) ventral view of tarsus II; (80) ventral view of tarsus III; (81) ventral view of tarsus IV, scale = 50μ.

Soc. So. Afr. 21:266; Taufflieb, 1959, J. Ent. Soc. So. Afr. 22:406; Tipton, 1960, Univ. Calif. Publ. Ent. 16:275; Coffee, 1971, Zeitsch. Angew. Zool. 58:43-46.

Laelaps lamborni Hirst, 1925, Proc. Zool. Soc. Lond. 4:61 (Holotype: Karonga, Nyasaland; British Museum [Natural History], London); Zumpt, 1950, So. Afr. J. Med. Soc. 15:78; Keegan, 1956, J. Egypt. Publ. Hlth. Assoc. 31:260; Zumpt and Till, 1958, J. Ent. Soc. So. Afr. 21:266; Taufflieb, 1959, J. Ent. Soc. So. Afr. 22:460; Tipton, 1960, Univ. Calif. Publ. Ent. 16:273; Coffee, 1971, Zeitsch. Angew. Zool. 58:43-46.

DESCRIPTION.— *Female*: (Figs. 77-81) Dorsal plate length 634 μ, width 432 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae moderately long but not reaching base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated; setae st. 1 moderately long, reaching to base of setae st. 3. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae subequal to that between 4th genital setae; distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate relatively triangular, almost as wide as long, with anterior margin relatively straight; adanal setae rather long, extending distinctly beyond base of postanal seta; adanal setae set at level near posterior end of anal orifice. Unarmed venter bearing approximately 10 to 12 pairs of setaceous setae, 4 or 5 pairs adjacent to genital and anal plates plus 5 or 6 pairs near or on posterior body margins; metapodal plates oval. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length approximately equal to distance between adjacent setae; subterminal setae extend beyond posterior margins of dorsal plate. Nine to 12 pairs of setae bordering dorsal opisthosomal on soft integument. Proximal seta of coxa I of moderate length and setaceous, distal seta of coxa I relatively short, blunt, and peglike; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; tarsus II with two robust, blunt preapical setae, tarsus III with one blunt, robust preapical seta, and tarsus IV with one blunt preapical seta; all other leg setae setaceous and normally developed.

Male: (Figs. 82-83) Gnathosomal and hypostomal setae all setaceous, with medial hypostomal setae moderately long but not reaching to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, relatively long, each extending in length beyond base of seta immediately posterior by about one-third its length; holoventral plate rather narrow between coxae IV but considerably expanded posterior to coxae IV; expanded area between genital setae and anal orifice bears five pairs of setaceous setae; adanal setae of moderate length, extending slightly beyond base of postanal seta; metapodal plates not apparent; unarmed venter bearing 15 to 20 pairs of setaceous setae varying in length from rather short to quite long. Peritreme extending to middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae as in female. Both proximal and distal setae of coxa I setaceous; however, proximal seta much larger and more robust with distal seta about half the length; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxa II setaceous but somewhat robust; posterior seta of coxa III rather short, robust, and spinelike; one or two preapical setae on tarsi II and III spinelike but not blunt and peglike; all other leg setae setaceous and normally developed.

COLLECTION RECORDS

Elephantulus myurus
South Africa (ORS); 1 coll. (1 female); AMP

Macroscelides proboscideus
South Africa (ORS); 1 coll. (1 female); AMP

Crocidura sp.
Ghana; 2 coll. (3 females); AMP

Crocidura hirta
Rhodesia; 1 coll. (2 females); AMP

Hypsignathae monstrosus
Ivory Coast; 1 coll. (1 female); AMP

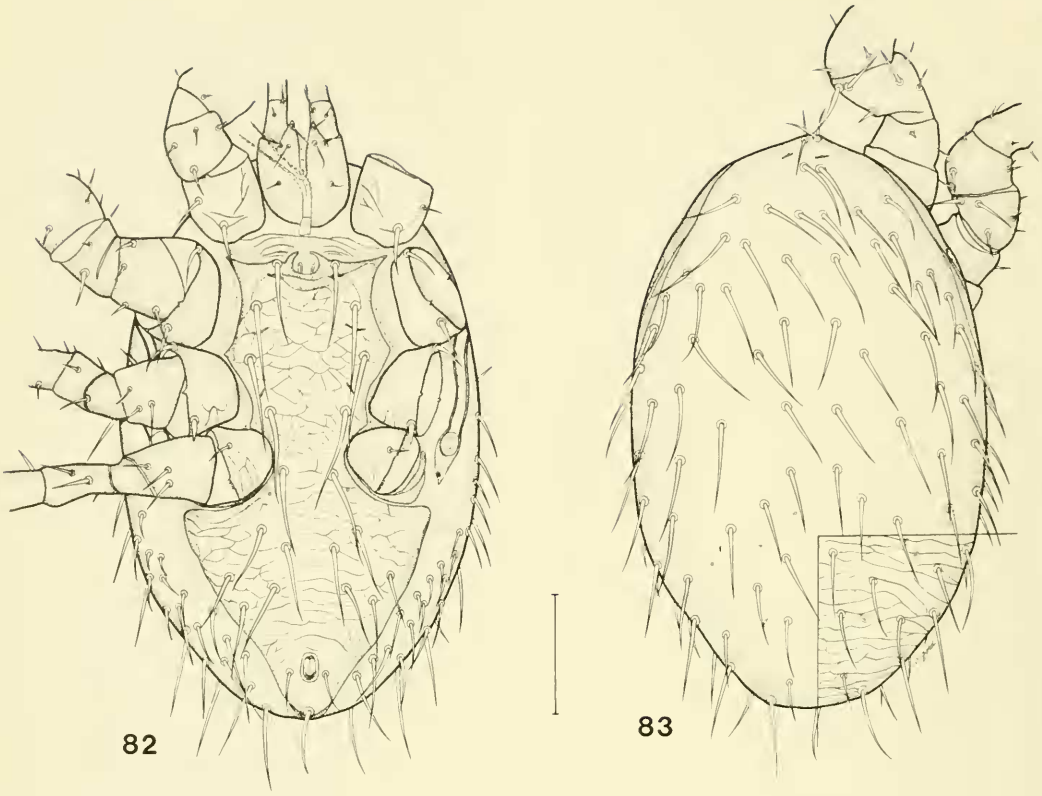
Nycteris hispida
Mauritania; 1 coll. (3 females); AMP

Nycteris macrotis
Senegal; 1 coll. (1 female); AMP

Rhinolophus simulator
Rhodesia; 1 coll. (1 female); AMP

Eptesicus capensis
South Africa (ORS); 1 coll. (2 females); AMP

Tadarida leonis
Senegal; 2 coll. (3 females); AMP



Figs. 82-83. *Laelaps liberiensis* Hirst, male. (82) venter; (83) dorsum. scale = 100μ.

Tadarida major
Upper Volta; 1 coll. (1 female); AMP
Tadarida pumila
Togo; 1 coll. (2 females); AMP
Galago senegalensis
Upper Volta; 3 coll. (5 females, 2 ny.); AMP
Ceropithecus mitis
Rhodesia; 1 coll. (1 female); AMP
Erythrocebus pata
Upper Volta; 1 coll. (1 female, 1 male); AMP
Lepus saxtilis
Botswana; 1 coll. (4 females); AMP
Cryptomys hottentotus
Botswana; 2 coll. (5 females, 1 male); AMP
South Africa (ORS); 1 coll. (1 female); AMP
South Africa; 2 coll. (2 females, 1 male); AMP
Graphiurus murinus
Nigeria (Afon); 2 females; Coffey, 1971
Desmodillus auricularis
South Africa (ORS); 1 coll. (1 female); AMP
Desmodillus braueri
Upper Volta; 2 coll. (2 females, 3 ny.); AMP
Gerbillus paeba
South Africa (ORS); 1 coll. (1 female); AMP
South Africa; 1 coll. (1 female, 1 ny.); AMP
Tatera sp.
Congo (Leopoldville); 6 females; Taufflieb, 1964
Tatera gambianus
Senegal; 3 coll. (1 female, 1 male, 3 ny.); AMP
Tatera guineae
Ghana; 1 coll. (1 female); AMP
Tatera kempi
Dahomey; 1 coll. (1 female, 1 male); AMP
Ghana; 1 coll. (12 females); AMP
Ghana (south); 1 female; Paperna et al, 1970
Ivory Coast; 6 coll. (8 females, 2 males, 1 ny.); AMP
Upper Volta; 1 coll. (1 female); AMP
Tatera leucogaster
Botswana; 2 coll. (4 females); AMP
South Africa (ORS); 1 coll. (1 female); AMP
South Africa; 5 coll. (4 females, 1 male); AMP
Taterillus gracilis
Upper Volta; 1 coll. (5 females, 3 ny.); AMP
Taterillus nigeriae
Nigeria (Dada); 1 male; Coffey, 1971

Dendromus melanotis
South Africa (ORS); 1 coll. (2 females); AMP
Malacothrix typicus
South Africa (ORS); 2 coll. (4 females); AMP
Steatomys caurinus
Ivory Coast; 1 coll. (6 females); AMP
Acomys cahirinus
Ghana; 1 coll. (1 female); AMP
Aethomys chrysophilus
Botswana; 2 coll. (2 females, 1 male); AMP
Rhodesia; 1 coll. (1 female); AMP
South Africa (ORS); 4 coll. (6 females); AMP
South Africa; 22 coll. (32 females, 16 males, 4 ny.); AMP
Aethomys namaquensis
South Africa (ORS); 4 coll. (4 females); AMP
South Africa (Cape); 1 female; Taufflieb, 1964
Aethomys stannarius
Nigeria (Ugar, Jabar); 6 females; Coffey, 1971
Arvicanthis niloticus
Egypt (El Talbiyo, Giza); Keegan, 1956
Ghana; 1 coll. (1 female); AMP
Ivory Coast; 1 coll. (1 female); AMP
Nigeria; 1 coll. (2 females); AMP
Nigeria (Panyam Fish Farm); 15 females, 3 males; Coffey, 1971
Nigeria (Ugar, Jabar); 3 females, 1 male; Coffey, 1971
Cricetomys emini
Upper Volta; 1 coll. (1 female); AMP
Cricetomys gambianus
Nigeria; 1 coll. (1 female, 1 male); AMP
Dasymys incomptis
Rhodesia; 1 coll. (2 females); AMP
Dephomys defua
Ghana; 1 coll. (2 females); AMP
Liberia (Gonyon Country); 1 female; Hirst, 1925
Grammomys dolichurus
Upper Volta; 1 coll. (3 females); AMP
Hylomyscus alleni
Ghana; 1 coll. (3 females, 5 males, 11 ny.); AMP
Togo; 3 coll. (3 females); AMP
Lemniscomys barbarus
Nigeria (Upper Ogum Ranch); 1 female, 1 male; Coffey, 1971
Lemniscomys griselda
South Africa; 1 coll. (1 female, 3 males); AMP
South Africa (Transvaal); 1 female; Taufflieb, 1964
Lemniscomys striatus
Nigeria; 2 coll. (6 females, 4 males); AMP
Togo; 3 coll. (8 females); AMP
Lophuromys sikapusi
Ghana; 1 coll. (4 females); AMP
Nigeria (Ibadan); 1 female; Coffey, 1971
Malacomys longipes
Ivory Coast; 1 coll. (2 females, 3 males, 9 ny.); AMP
Mastomys sp.
Angola (Dundo); 2 females; Taufflieb, 1962
Mastomys albicaudatus
South Africa (ORS); 1 coll. (2 females); AMP
Mastomys coucha
Bas-Congo (Boma-Matadi); 178 females; Taufflieb, 1964
Congo (Brazzaville); Taufflieb, 1962
Mastomys erythroleucus
Ivory Coast; 26 coll. (120 females, 39 males, 129 ny.); AMP
Mastomys natalensis
Botswana; 1 coll. (3 females); AMP
Dahomey; 1 coll. (6 females); AMP
Ghana (Acra-Tema); Paperna et al., 1970
Ghana; 100 coll. (321 females, 64 males, 101 ny.); AMP
Ivory Coast; 54 coll. (168 females, 61 males, 39 ny.); AMP
Nigeria (Panisau); 1+coll.; AMP Zumpt collection
Nigeria; 68 coll. (292 females, 94 males, 246 ny.); AMP
Rhodesia; 59 coll. (258 females, 9 males, 4 ny.); AMP
Senegal; 213 coll. (877 females, 112 males, 361 ny.); AMP
South Africa (ORS); 27 coll. (50 females); AMP
South Africa (Transvaal); 1 female; Taufflieb, 1964
South Africa; 102 coll. (302 females, 119 males, 69 ny.); AMP
Togo; 4 coll. (10 females, 1 male, 2 ny.); AMP
Upper Volta; 63 coll. (79 females, 62 males, 89 ny.); AMP
Mus minutoides
South Africa (ORS); 4 coll. (5 females); AMP
South Africa; 1 coll. (1 male); AMP
Mus musculus
Egypt (Nahya, Imbaba, Giza); Keegan, 1956
Mus musculoides
Nigeria (Ibadan); 3 females; Coffey, 1971
Nigeria (Federal Dist.); 2 females; Coffey, 1971
Senegal; 1 coll. (1 female); AMP
Togo; 1 coll. (2 females, 1 male); AMP
Myomys daltoni
Ghana; 3 coll. (4 females); AMP
Ivory Coast; 1 coll. (1 female); AMP
Senegal; 9 coll. (19 females, 7 males, 11 ny.); AMP
Praomys daltoni
Nigeria (Zaria); 2 females; Coffey, 1971
Praomys fumatus
Nigeria (Iella); Coffey, 1971
Praomys jacksoni
Angola (Dundo); 1 female; Taufflieb, 1962
Congo (Leopoldville); 1 female; Taufflieb, 1964
Kenya (Rift Valley Prov.); Keegan, 1956
Praomys tullbergi
Congo (Brazzaville); Taufflieb, 1962
Ghana; 4 coll. (4 females); AMP

Nigeria; 3 coll. (3 females, 3 males, 3 ny.); AMP
Togo; 1 coll. (1 female, 1 ny); AMP
"Rats"
Kenya (No. Kitosh & Wamia); Hirst, 1925
Nyasaland (Karonga); Hirst, 1925
Praomys morio
Cameroon; Taufflieb and Mouchet, 1959
Congo (Brazzaville); Zumpt, 1961
Rattus frugivorus
Congo (Brazzaville); Taufflieb, 1962
Rattus norvegicus
Cameroon (Yaounde); Zumpt, 1961
Rattus rattus
Congo (Leopoldville); 1 female; Taufflieb, 1964
Nigeria (Onitri); Keegan, 1956
Rhabdomys pumilio
Kenya (Njoro, Rift Valley); Keegan, 1956
South Africa (ORS); 10 coll. (13 females); AMP
South Africa; 6 coll. (16 females, 7 males, 3 ny.); AMP
Saccostomus campestris
South Africa (ORS); 4 coll. (5 females); AMP
South Africa; 1 coll. (3 females); AMP
Thamnomys rutilans
Togo; 1 coll. (1 female); AMP
Uranomys ruddi
Ivory Coast; 1 coll. (1 female); AMP
Otomys irroratus
South Africa (ORS); 1 coll. (1 female); AMP
Thryonomys swinderianus
Rhodesia; 1 coll. (1 female); AMP
Funisciurus pyrrhopus
Ivory Coast; 1 coll. (1 female); AMP
Nigeria (Felele); 1 female; Coffey, 1971
Ictonyx striatus
South Africa (ORS); 1 coll. (2 females); AMP
Genetta servalina
Senegal; 1 coll. (1 female); AMP
Genetta villiersi
Ivory Coast; 1 coll. (1 female); AMP
Crossarchus obscurus
Ivory Coast; 1 coll. (1 female, 1 male); AMP
Herpestes sanguineus
Rhodesia; 1 coll. (2 females); AMP
Unknown host
Botswana; 18 coll. (204 females, 12 males, 5 ny.); AMP
Ivory Coast; 5 coll. (28 females, 9 males, 3 ny.); AMP
Rhodesia; 1 coll. (7 females); AMP
Togo; 1 coll. (8 females); AMP
South Africa; 35 coll. (73 females, 21 males, 29 ny.); AMP

Remarks.— *L. liberiensis* is phenetically quite close to *L. setzeri*, *L. benoiti*, *L. algericus*, and *L. nuttalli*. It is easily separated from *L. nuttalli* by the shorter peritreme, and from *L. algericus* by the lack of a heavily sclerotized anterolateral margin of the dorsal plate. Also, *L. algericus* has not been reported from the Ethiopian region, although it does occur in Africa just north of the Sahara. *L. liberiensis* differs from *L. benoiti* by a distinctly shallower invagination of the posterior margin of the sternal plate and the absence of a pair of posterior projections on the sternal plate; also, the body setae, especially dorsally, are somewhat less robust than in *L. benoiti*. *L. liberiensis* is easily separated from *L. setzeri* by the size of the posterior central setae of the dorsal plate. In the former all dorsal setae are medium size to long, whereas in the latter the setae of the posterior central area are much reduced in length. Another character which may be used to separate *L. liberiensis* from other taxa of major group II is the presence of only two blunt, peglike preapical setae on tarsus II, and two or three such setae on tarsus III but with only one in the preapical position.

L. liberiensis was synonymized with *L. lamborni* by Coffey (1971), a decision with which we fully agree. This species is the most widely distributed of all *Laelaps* species in Africa, both in geographic distribution and in host association. It has been reported from a multitude of hosts throughout the Ethiopian region as well as in Africa north of the Sahara (Egypt and Morocco). The host with which it is most closely associated is *Mastomys natalensis;* in the collections of the African Mammal Project by far the majority of the collections of this mite were from this host species.

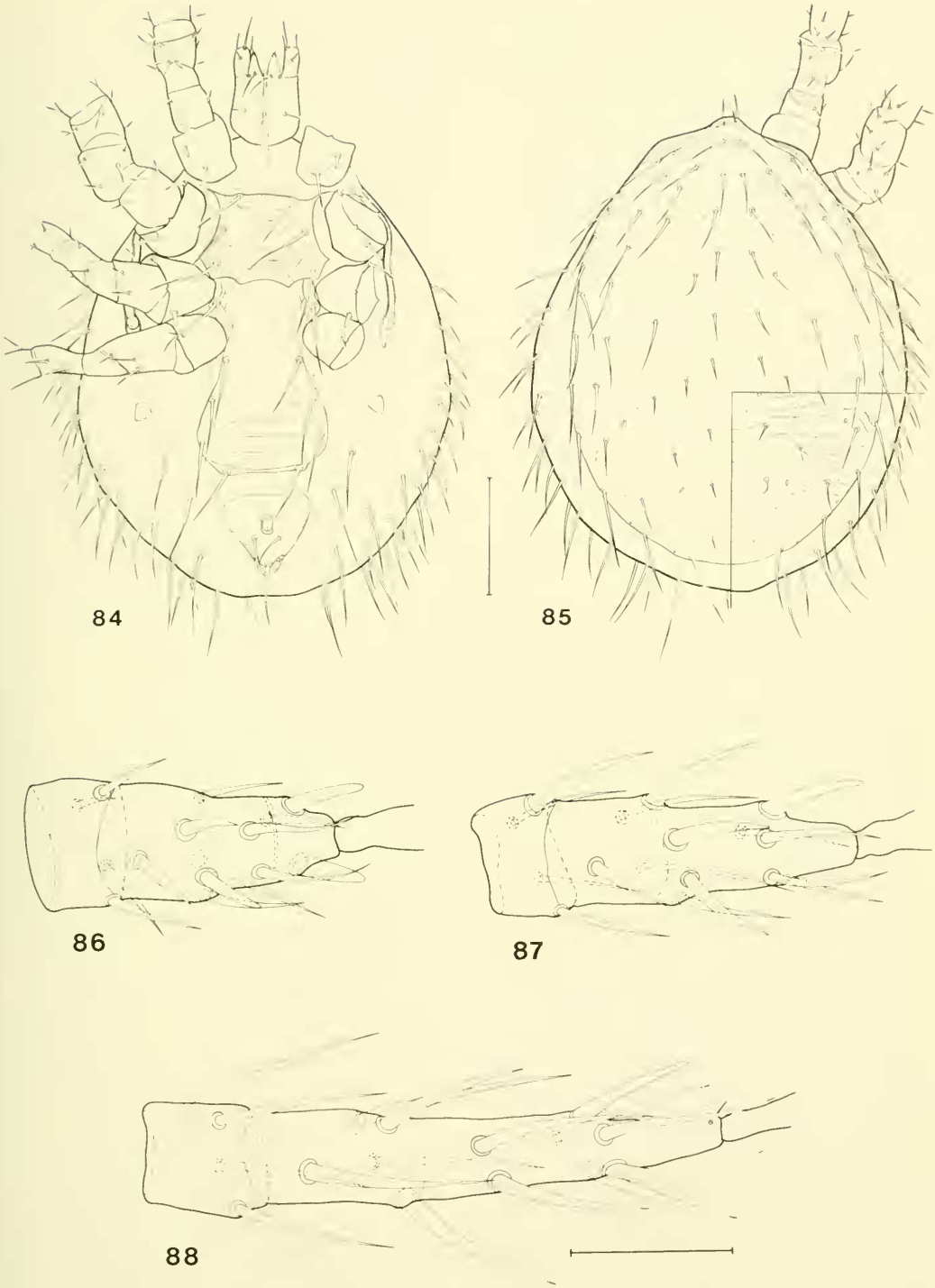
During the examination of specimens of *L. liberiensis* from the different localities and hosts, a certain amount of morphological variability was observed, primarily in the size and general shape of body structures. The large collection of specimens in the African Mammal Project would be ideal for further statistical analyses of intraspecific variability between localities and host species.

Laelaps (*Laelaps*) *setzeri* Coffee

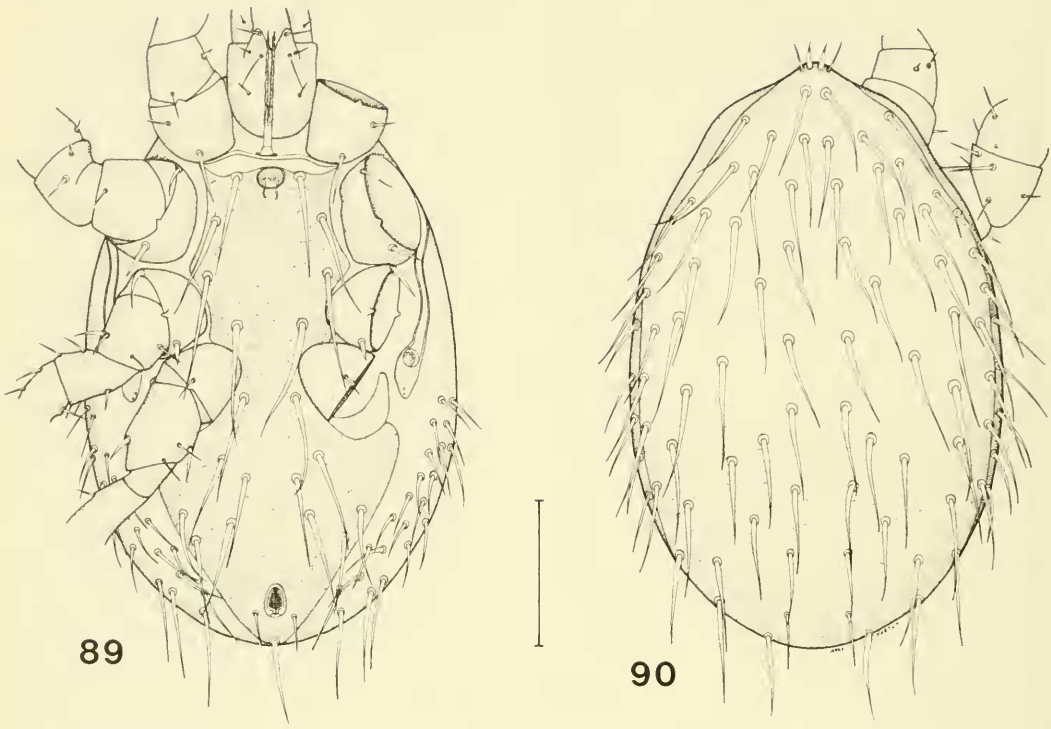
Figs. 84-90

Laelaps setzeri Coffee, 1971, Zeitschr. Angew. Zool. 58:49-51 (Holotype: Tsanchaga, Northern Nigeria; U. S. National Museum, Washington, D. C.).

Description.— *Female*: (Figs. 84-88) Dorsal plate length 714 μ, width 512 μ. Gnathosomal and hypostomal setae seta-



Figs. 84-88. *Laelaps setzeri* Coffee, female. (84) venter; (85) dorsum, scale = 200μ; (86) ventral view of tarsus II; (87) ventral view of tarsus III; (88) ventral view of tarsus IV. scale = 50μ.



Figs. 89-90. *Laelaps setzeri* Coffee, male. (89) venter; (90) dorsum, scale = 100μ.

ceous; medial hypostomal setae of moderate length, not reaching to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated medially; setae st. 1 of moderate length, reaching almost to level of base of setae st. 3. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae and 4th genital setae subequal; distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level near 3rd pair of genital setae. Anal plate triangular in shape, almost as wide as long, and with anterior margin straight; adanal setae of moderate length, extending to or slightly beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing 14 to 16 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates, plus approximately 10 to 12 pairs near or on posterior lateral body margin; metapodal plates irregularly oval, width approximately equal to length. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; anterior, lateral, and all marginal dorsal setae relatively long, but about 7 pairs of posterior central dorsal setae rather small; subterminal setae (J5) smallest, reaching no further than level of base of setae Z5. Ten to 12 pairs of setae border dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous and of moderate length, distal seta of coxa I short, robust, and peglike; setae pd 1 and ad 1 of femur I of moderate length and subequal; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxa II of moderate length, blunt, and peglike; posterior seta of coxa III rather short, robust, and peglike; tarsus II with two robust, blunt, peglike preapical setae; tarsi III and IV each with one rather robust, blunt preapical setae; all other leg setae setaceous and normally developed.

Male: (Figs. 89-90) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae; ventral setae, except adanal and postanal setae, very long and slender, each extending much beyond base of adjacent posterior setae; holoventral plate broad be-

tween coxae II and III, extremely narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending to or slightly beyond base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta at least twice as long as adanal setae and somewhat more robust. Metapodal plates inapparent, apparently fused to lateral extension of holoventral plate; unarmed venter bearing approximately 12 to 14 pairs of setaceous setae adjacent to holoventral plate, more marginal setae much longer. Peritreme extending to middle of coxae II. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae approximately as in female. Both proximal and distal setae of coxa I setaceous; however, proximal seta much longer and much more robust than short, slender distal seta; setae pd 1 and ad 1 of femur I subequal in length, pd 1 seta slightly longer; anterior seta of coxae II, III, and IV setaceous and somewhat enlarged basally; posterior seta of coxa II of medium length, rather robust, and somewhat spinelike; and posterior seta of coxa III short, robust, and spinelike to peglike; 1 seta of each tarsus II and III robust, blunt, and peglike; several other pairs of setae of tarsi II and III rather robust and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

Collection records

Hipposideros caffer
Ivory Coast; 1 coll. (2 females, 1 male); AMP
Scotophilus nigrita
Ivory Coast; 1 coll. (6 females); AMP
Acomys cahirinus
Ghana; 1 coll. (1 female); AMP
Malacomys longipes
Togo; 1 coll. (4 females, 3 males, 1 ny.); AMP
Mastomys natalensis
Togo; 2 coll. (2 females); AMP
Mus musculoides
Nigeria (Ilashe); 3 females; Coffey, 1971
Togo; 2 coll. (4 females); AMP
Praomys alleni
Nigeria (Tsanchaga); 13 females; Coffey, 1971
Nigeria (Federal Dist.); 2 females; Coffey, 1971
Nigeria (Igbo-Ora); 2 females; Coffey, 1971
Praomys jacksoni
Nigeria (Igbo-Ora); 2 females; Coffey, 1971
Nigeria (Kudo); 1 female; Coffey, 1971
Praomys tullbergi
Ghana; 31 coll. (32 females, 21 males, 12 ny.); AMP
Ivory Coast; 39 coll. (64 females, 62 males, 140 ny.); AMP
Nigeria (Sapaba); 1 female; Coffey, 1971
Nigeria (Federal Dist.); 3 females; Coffey, 1971
Nigeria; 1 coll. (1 female, 1 male, 5 ny.); AMP
Senegal; 2 coll. (7 females, 1 male,); AMP
Togo; 63 coll. (149 females, 36 males, 8 ny.); AMP
Rattus rattus
Ivory Coast; 1 coll. (1 female); AMP
Unknown host
Ivory Coast; 1 coll. (1 female); AMP
Togo; 1 coll. (2 females); AMP

Remarks.— *L. setzeri* may be easily distinguished from other closely related taxa by the following characters: distinctly shorter setae on the dorsal plate posterior and central in position; tarsus II with only two blunt, peglike preapical setae; and the posterior margin of the sternal plate only slightly invaginated and if pair of posterior projections present, rather small.

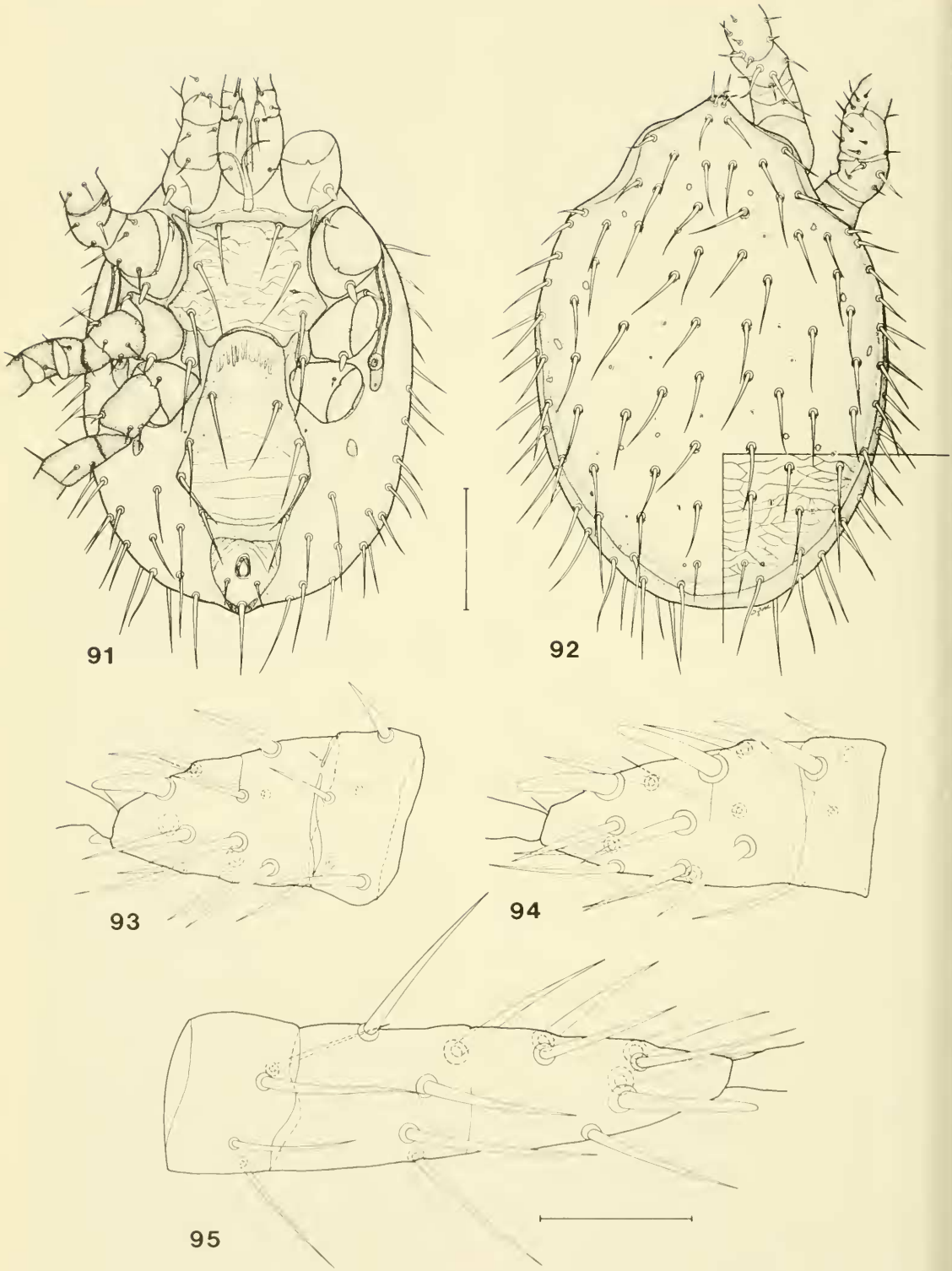
This taxon is reported primarily from *Paromys* species, most frequently *P. tullbergi*, in northwestern Africa south of the Sahara.

Laelaps (*Laelaps*) *benoiti* Taufflieb

Figs. 91-97

Laelaps benoiti Taufflieb. 1964. Rev. Zool. Bot. Afr. 69(3-4):377-380 (Holotype: Kibombo, Lwiro, Kivu, Congo-Leopoldville; Musée Royal de l'Afrique Centrale, Turvuren, Belgium).

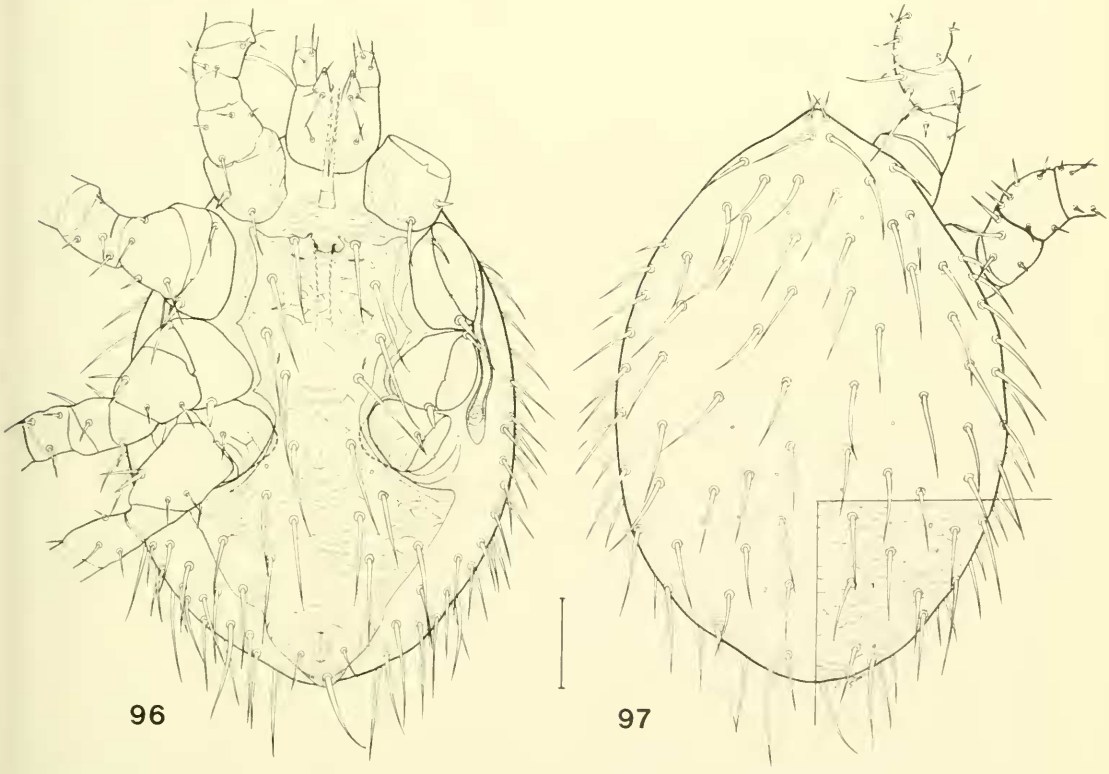
Description.— *Female*: (Figs. 91-95) Dorsal plate length 770 μ, width 570 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae relatively long, but not reaching to base of gnathosomal setae. Posterior margin of sternal plate moderately invaginated medially, with two posterior projections between 3rd sternal setae and medial invagination; setae st. 1 of medium length, reaching to level halfway between 2nd and 3rd sternal setae. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly; distance between 1st genital setae somewhat less than distance between 4th genital setae,



Figs. 91-95. *Laelaps benoiti* Taufflieb, female. (91) venter; (92) dorsum, scale = 200μ; (93) ventral view of tarsus II; (94) ventral view of tarsus III; (95) ventral view of tarsus IV, scale = 50μ.

distance between 2nd genital setae less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate triangular in general shape, almost as wide as long, with anterior margins straight to slightly convex or invaginated; adanal setae of medium length, extending slightly beyond base of postanal seta; adanal setae set at level posterior to anal orifice; postanal seta over twice as long as adanal seta and more robust. Unarmed venter bearing 12 to 14 pairs of setaceous setae, 4 pairs adjacent to genital and anal plates plus approximately 8 to 10 pairs near or on posterior lateral body margins; metapodal plates oval, only slightly longer than wide. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long and robust, length slightly greater than distance between adjacent setae; subterminal setae (J5) of moderate length, reaching distinctly beyond posterior margin of dorsal plate; terminal setae (Z5) about twice as long as subterminal setae. Six to 8 pairs of setae border dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous and of medium length; distal seta of coxa I short, robust, and peglike; setae pd 1 and ad 1 of femur I unequal in length, seta pd 1 somewhat longer than ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous, with coxa IV seta rather small; posterior seta of coxae II and III robust, blunt, and peglike; tarsi II and III each with two rather robust, blunt preapical setae, and tarsus IV with one blunt preapical seta; most other leg setae setaceous and normally developed.

Male: (Figs. 96-97) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae quite long, extending to or slightly beyond base of gnathosomal setae. Ventral setae, except adanal setae, rather long and somewhat robust, each extending in length well beyond base of seta immediately posterior or adjacent; holoventral plate rather broad between coxae II and III, much narrowing between coxae IV, and greatly expanded posterior to



Figs. 96-97. *Laelaps benoiti* Taufflieb, male. (96) venter; (97) dorsum. scale = 100μ.

coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setae; adanal setae of medium length, extending well beyond base of postanal seta, adanal setae set at level slightly posterior to middle of anal orifice; postanal seta twice as long as adanals and rather robust. Metapodal plate inapparent, apparently fused with lateral extensions of holoventral plate; soft integument of opisthosoma bearing 14 to 16 pairs of setae. Proximal seta of coxa I setaceous and of moderate length; distal seta of coxa I short, robust, and spinelike; seta pd 1 of femur I slightly longer than seta ad 1; anterior seta of coxae I and III and seta of coxa IV setaceous; posterior seta of coxa II robust and spinelike, but posterior seta of coxa III robust and peglike and somewhat shorter; two setae of each tarsi II and II robust and spinelike rather than blunt; most other leg setae setaceous and normally developed.

Collection records

Hipposideros caffer
Ivory Coast; 1 coll. (1 female); AMP

Mus bella
Congo-Leopoldville (Kwiro, Kivu, Kibombo); 2 females; Taufflieb, 1964

Mus minutoides
Ghana; 1 coll. (1 female); AMP
Rhodesia; 1 coll. (4 females, 1 male); AMP

Mus musculoides
Ghana (Odomi, Jongo); 1+ coll.; AMP Zumpt Collection
Ghana; 3 coll. (3 females); AMP
Ivory Coast; 3 coll. (4 females); AMP
Nigeria (Ilashe, Igbo-Ora); 3+ coll.; AMP Zumpt Collection

Mus setulosus
Ghana; 6 coll. (15 females, 2 males); AMP
Ivory Coast; 8 coll. (14 females, 1 male); AMP

Praomys tullbergi
Ghana; 1 coll. (1 female); AMP
Togo; 1 coll. (1 female); AMP

Unknown host
Togo; 1 coll. (1 female); AMP

Remarks.— *L. benoiti* may be separated from the other taxa of subgroup B by the presence of a pair of prominent projections on the sternal plate, with a moderate invagination medially between the projections. In this character this mite resembles *L. brazzai* but differs from it in several other notable characters, i. e., all dorsal setae distinctly longer, setae J4 extending almost to level of setae J5, setae J5 extending beyond posterior margin of dorsal plate, and sternal plate longer, approximately as long as wide.

This mite has been collected primarily from *Mus* species in northwestern Africa south of the Sahara; however, one collection of four females and one male from Rhodesia has been tentatively identified as *L. benoiti*.

Subgroup C

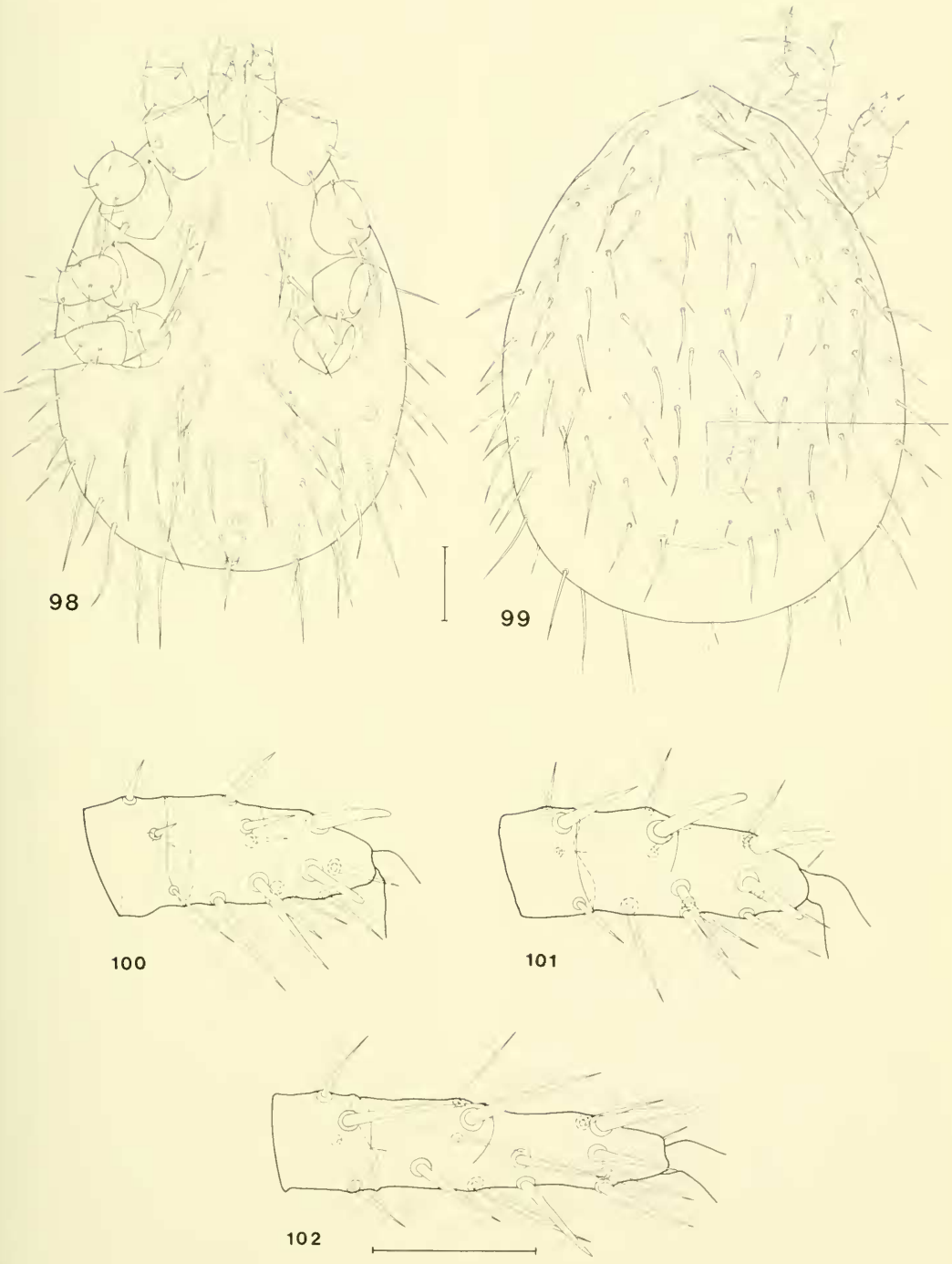
As noted in the discussion of subgroup B, there is no set of distinguishing characters which can be used to separate this group of five taxa from those of subgroup B; however, in the several numerical taxonomic analyses four of these five taxa clustered together.

Laelaps (Laelaps) brandbergensis Taufflieb

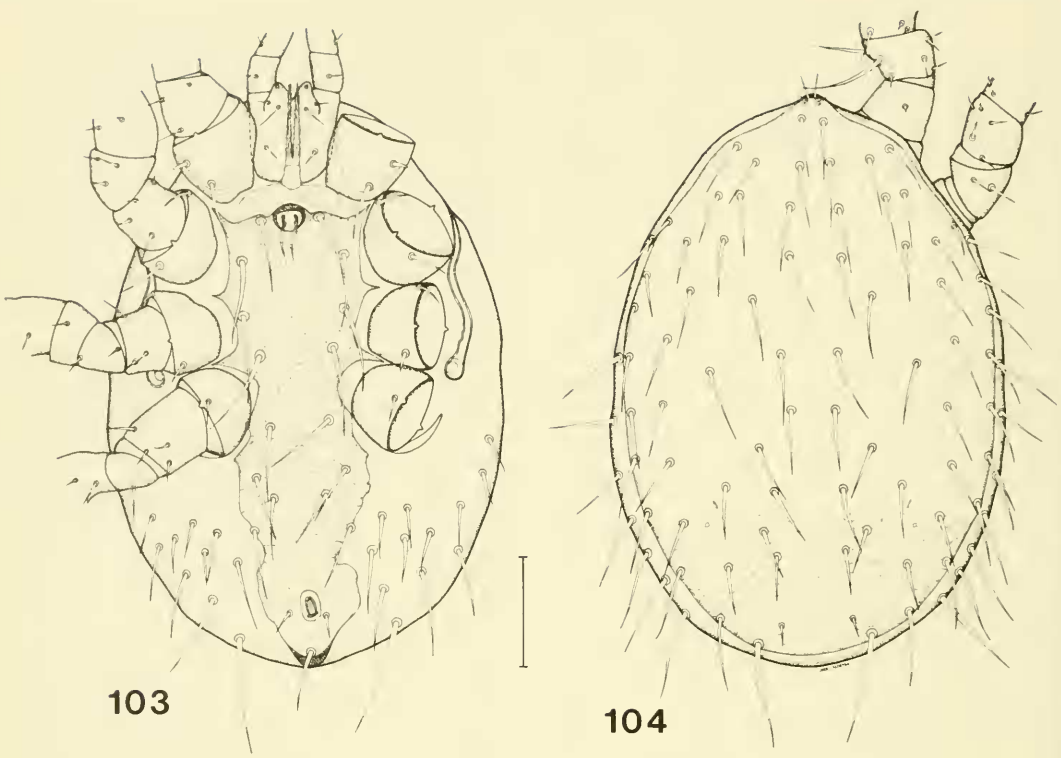
Figs. 98-104

Laelaps brandbergensis Taufflieb, 1959, J. Ent. Soc. S. Afr. 22(2):400. (Holotype: Brandberg, Southwest Africa; South African Institute for Medical Research, Johannesburg).

Description.— *Female*: (Figs. 98-102) Dorsal plate length 575 μ, width 410 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching to or slightly beyond base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 long, reaching almost to posterior margin of sternal plate. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae slightly greater than distance between 4th genital setae; distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate roundly triangular, as wide as long, with anterior margins slightly rounded; adanal setae of moderate length, extending slightly beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing aproximately 12 pairs of setaceous setae, 6 pairs adjacent to genital and anal plates plus approximately 6 pairs near or on posterior lateral body margins; ventral setae all relatively long and somewhat robust; metapodal plates irregularly oval, width equal to length. Peritreme extending



Figs. 98-102. *Laelaps brandbergensis* Taufflieb, female. (98) venter; (99) dorsum, scale = 100μ; (100) ventral view of tarsus II; (101) ventral view of tarsus III; (102) ventral view of tarsus IV, scale = 50μ.



Figs. 103-104. *Laelaps brandbergensis* Taufflieb, male. (103) venter; (104) dorsum, scale = 100μ.

to middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length usually greater than distance between adjacent setae; subterminal setae (J5) quite short, reaching no further than terminal setae (Z5). Six to 8 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous and of moderate length; distal seta of coxa I quite robust, short, and peglike; seta pd 1 of femur I rather long, almost twice the length of seta ad 1; anterior seta of coxae II and III and seta of coxa IV slender and setaceous; posterior seta of coxae II and III rather robust, blunt, and peglike; tarsi II and III each with two rather short, robust, blunt, preapical setae, tarsus IV with one moderately long, blunt preapical seta; other leg setae mostly setaceous and normally developed.

Male: (Figs. 103-104) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching at least half distance to base of gnathosomal setae. Ventral setae, except adanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and rather narrow posterior to coxae IV; holoventral plate posterior to coxae IV with irregular lateral margins; expanded area between genital setae and anal orifice bearing only 3 pairs of setaceous setae, other 2 pairs which are usually on the holoventral plate set off on soft integument; adanal setae rather short, not extending to base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta 2 or 3 times as long as adanal setae and quite robust; unarmed venter bearing approximately 14 to 15 pairs of setaceous setae adjacent to holoventral plate, those more anterior and medial in position shorter with the more marginal setae rather long. Metapodal plates somewhat oval in shape. Peritreme extending to middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae

approximately as in female. Proximal seta of coxa I rather long and setaceous, with distal seta of coxa I short, robust, and spinelike; seta pd 1 of femur I approximately twice as long as seta ad 1; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV setaceous; posterior seta of coxa III shorter, robust, and spinelike; 2 or 3 pairs of mostly preapical setae of tarsi II and III short, robust, and peglike, with some other setae of tarsi II, III, and IV somewhat spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and somewhat spinelike.

COLLECTION RECORDS
Petromyscus collinus
Southwest Africa; 7 females (type specimens); Taufflieb, 1959
South Africa (ORS); 16 coll. (31 females); AMP
Aethomys namaquensis
South Africa (ORS); 1 coll. (1 female); AMP

REMARKS.— The most diagnostic character of *L. brandbergensis* is the unusually long pd 1 seta of femur I: the pd 1 seta is nearly two times as long as the ad 1 seta. All other phenetically similar taxa bear a much shorter pd 1 seta on femur I, only slightly longer than the ad 1 seta.

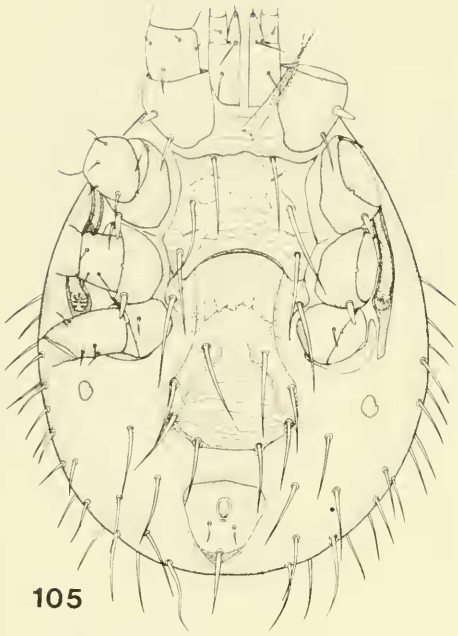
This mite is known only from southern Africa primarily parasitic on *Petromyscus collinus*. A single collection is reported from *Aethomys namaquensis*.

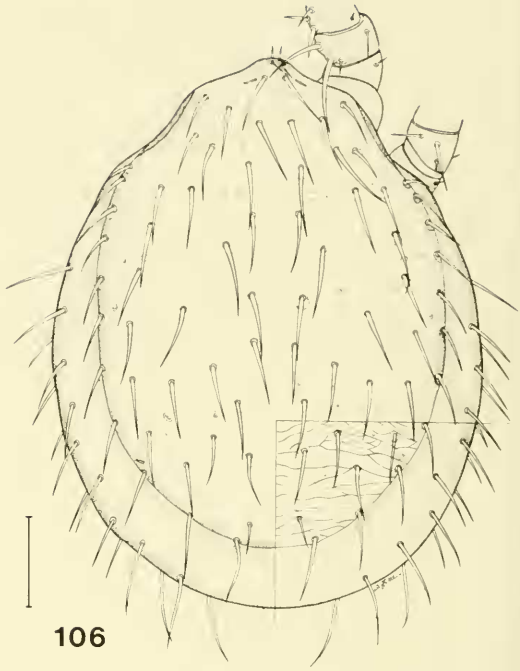
Laelaps (*Laelaps*) *zumpti* Keegan
Figs. 105-111

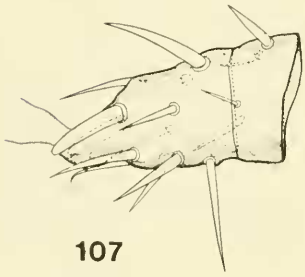
Laelaps zumpti Keegan, 1956, J. Egypt. Publ Hlth. Assn. 31(6):263 (Holotype: Mjoro, Rift Valley Province, Kenya; U.S. National Museum, Washington, D.C.); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):285.

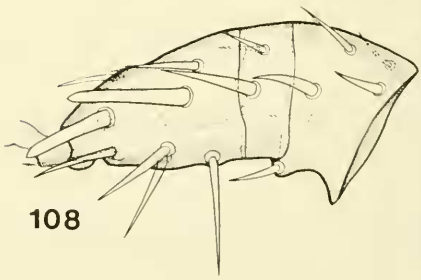
DESCRIPTION.— *Female*: (Figs 105-109) Dorsal plate length 514 μ, width 401 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching to or almost to base of gnathosomal setae. Posterior margin of sternal plate moderately invaginated, invagination reaching to level of 3rd sternal setae; setae st. 1 relatively long, reaching beyond level of 2nd pair of sternal pores but not to posterior margin of sternal plate. Anterior flap of genital plate only slightly overlapping posterior margin of sternal plate; distance between 1st genital setae subequal to distance between 4th genital setae, and distance between 2nd genital setae subequal to distance between 3rd genital setae; greatest width of genital plate at level between 2nd and 3rd pairs of genital setae. Anal plate triangular in general shape, anterior margin slightly convex to slightly concave; adanal setae of moderate length, extending to or almost to base of postanal seta; adanal setae set at level of posterior end of anal orifice. Unarmed venter bearing approximately 12 to 14 pairs of setaceous setae, 4 pairs adjacent to genital and anal plate plus approximately 8 to 10 pairs near or on posterior lateral body margins; metapodal plate almost circular, width almost equal to length. Peritreme extending to level of middle of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length slightly greater than distance between adjacent setae; subterminal setae (J5) reaching slightly beyond posterior margin of dorsal plate. Approximately 9 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I setaceous, distal seta short, blunt, and peglike, and approximately half the length of proximal seta; setae pd 1 and ad 1 of femur I subequal in length, with ad 1 setae slightly longer; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III robust, blunt, and peglike; tarsi II and III each with two rather robust, blunt preapical setae; tarsus IV may have one blunt preapical setae or all setaceous; all other leg setae setaceous and normally developed.

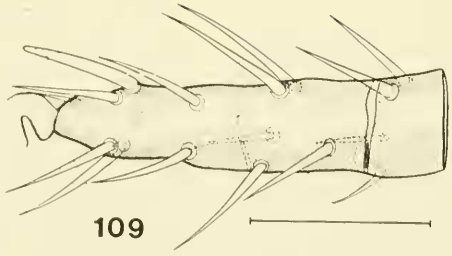
Male: (Figs. 110-111) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching almost to base of gnathosomal setae. Ventral setae, except adanal setae and postanal seta, of moderate length, each extending in length well beyond base of seta immediately posterior; holoventral plate filling area between coxae II and III, narrowing considerably between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae relatively short, extending no further than to base of postanal seta; postanal seta somewhat more robust and about twice as long as adanal setae. Metapodal plates inapparent or joining holoventral plate lat-



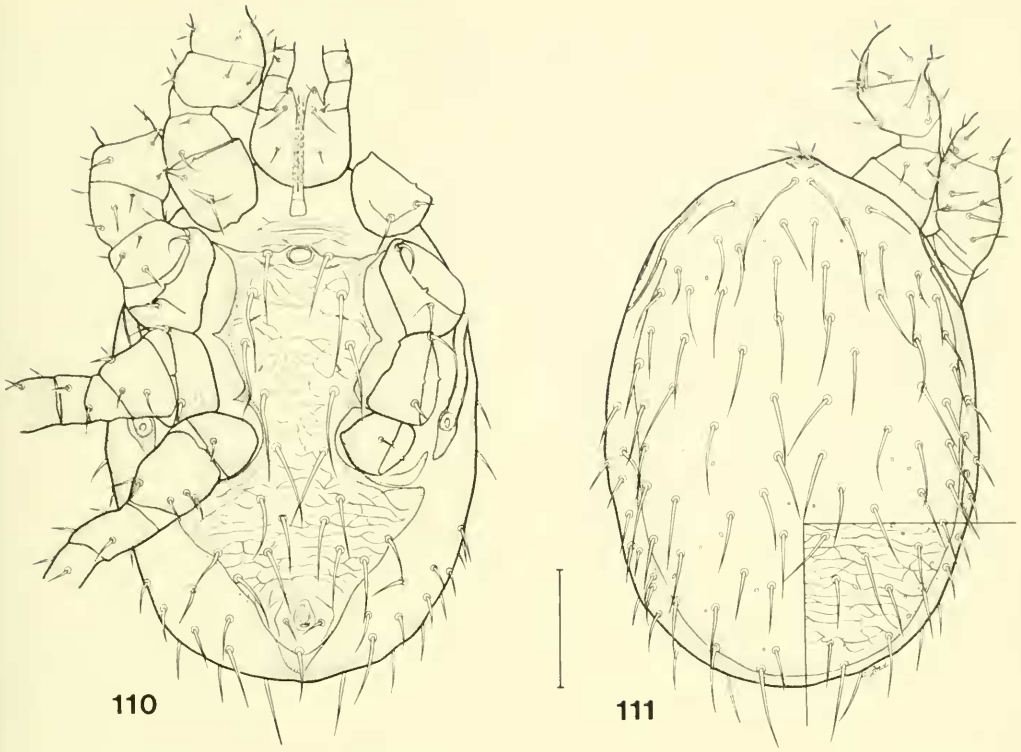








Figs. 105-109. *Laelaps zumpti* Keegan, female. (105) venter; (106) dorsum, scale = 100μ; (107) ventral view of tarsus II; (108) ventral view of tarsus III; (109) ventral view of tarsus IV, scale = 50μ.



Figs. 110-111. *Laelaps zumpti* Keegan, male. (110) venter; (111) dorsum, scale = 100μ.

erally; unarmed venter bearing 6 to 8 pairs of setae adjacent to holoventral plate. Peritreme extending to level of anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; length and position as in female. Soft integument of opisthosoma bearing about 8 to 12 pairs of setae. Both proximal and distal setae of coxae I setaceous, with proximal seta considerably longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxa II setaceous, posterior seta of coxa III spinelike; tarsi II and III each with about two pairs of spinelike preapical setae; all other leg setae setaceous and normally developed.

Collection records

Aethomys chrysophilus
Rhodesia; 1 coll. (1 female); AMP

Lemniscomys striatus
Kenya (Rift Valley); 1 female; Keegan, 1956

Mus bella
Congo (Leopoldville); 10 females, 1 male; Keegan, 1956

Mus minutoides
Rhodesia; 1 coll. (1 female); AMP

Mus triton
Kenya (Rift Valley); 1 female, 2 males, 2 ny. (type specimens); Keegan, 1956

Remarks.— *L. zumpti* is quite similar to *L. brazzai* and *L. brandbergensis* in overall characteristics; however, it may be easily separated by the unusually short adanal setae and by the shape of the sternal plate which has a distinctly broader and deeper invaginated posterior margin and prominent extensions posterior and lateral to the 3rd sternal setae. In *L. brandbergensis* the posterior margin of the sternal plate is only slightly invaginated with no posterior lateral projections, and in *L. brazzai* the posterior invagination is only slight and is between two small, more medial posterior projections.

This taxon is parasitic primarily on *Mus* species in the southern half of Africa from Congo and Kenya to Rhodesia.

Laelaps (*Laelaps*) *brazzai* Taufflieb

Figs. 112-118

Laelaps brazzai Taufflieb, 1962, Acarologia t. IV. fasc. 4:499-501 (Holotype: Brazzaville, Congo; pers. coll. of R. Taufflieb).

Description.— *Female*: (Figs. 112-116). Dorsal plate length 408 μ, width 397 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching beyond base of gnathosomal setae. Posterior margin of sternal plate irregular, slightly invaginated medially between two small posterior projections; setae st. 1 of moderate length, reaching halfway between 2nd and 3rd sternal setae; sternal setae as well as 4 pairs of genital setae rather robust. Anterior flap of genital plate overlapping posterior margin of sternal plate slightly; distance between 1st genital setae slightly less than distance between 4th genital setae, and distance between 2nd genital setae less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate roundly triangular, almost as wide as long, with anterior margins irregularly rounded; adanal setae of moderate length, extending somewhat beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice; postanal seta rather robust. Unarmed venter bearing approximately 12 pairs of setaceous setae, 5 or 6 pairs adjacent to genital and anal plates plus 4 to 6 pairs near or on posterior lateral body margins; metapodal plates irregularly oval, slightly longer than wide. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length, length usually no greater than distance between adjacent setae; subterminal setae (J5) reaching no further than posterior margin of dorsal plate. Eight to 10 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I of moderate length and spinelike, distal seta of coxa I quite robust and peglike; seta pd 1 of femur I somewhat longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous, coxa IV seta rather small; posterior seta of coxae II and III rather robust, blunt, and peglike; tarsi II and III each with 3 blunt, preapical setae, and tarsus IV with 1 or 2 blunt preapical setae; most other leg setae setaceous and normally developed; however, some may be shorter and spinelike.

Male: (Figs. 117-118) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending to or slightly beyond base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta at least twice as long as adanals and somewhat more robust. Metapodal plates inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing approximately 10 pairs of setaceous setae adjacent to holoventral plate, 2 or 3 posteriorly located pairs rather long, with other more anteriorly located pairs about half this length. Peritreme extending to middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; length and position of setae approximately as in female. Soft integument of opisthosoma bearing approximately 8 to 10 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length, pd 1 slightly longer; anterior seta of coxae II and III, posterior seta of coxa II, and seta of coxa IV all setaceous; posterior seta of coxa III shorter, robust, and spinelike; no blunt, preapical setae on tarsi II, III, or IV; however, some preapical setae robust and spinelike; most other leg setae setaceous and normally developed; however, some often shorter and spinelike.

Collection records

Colomys goslingi
Congo-Leopoldville (Lwiro, Bukavu, Kivu): 2 females; Taufflieb, 1964

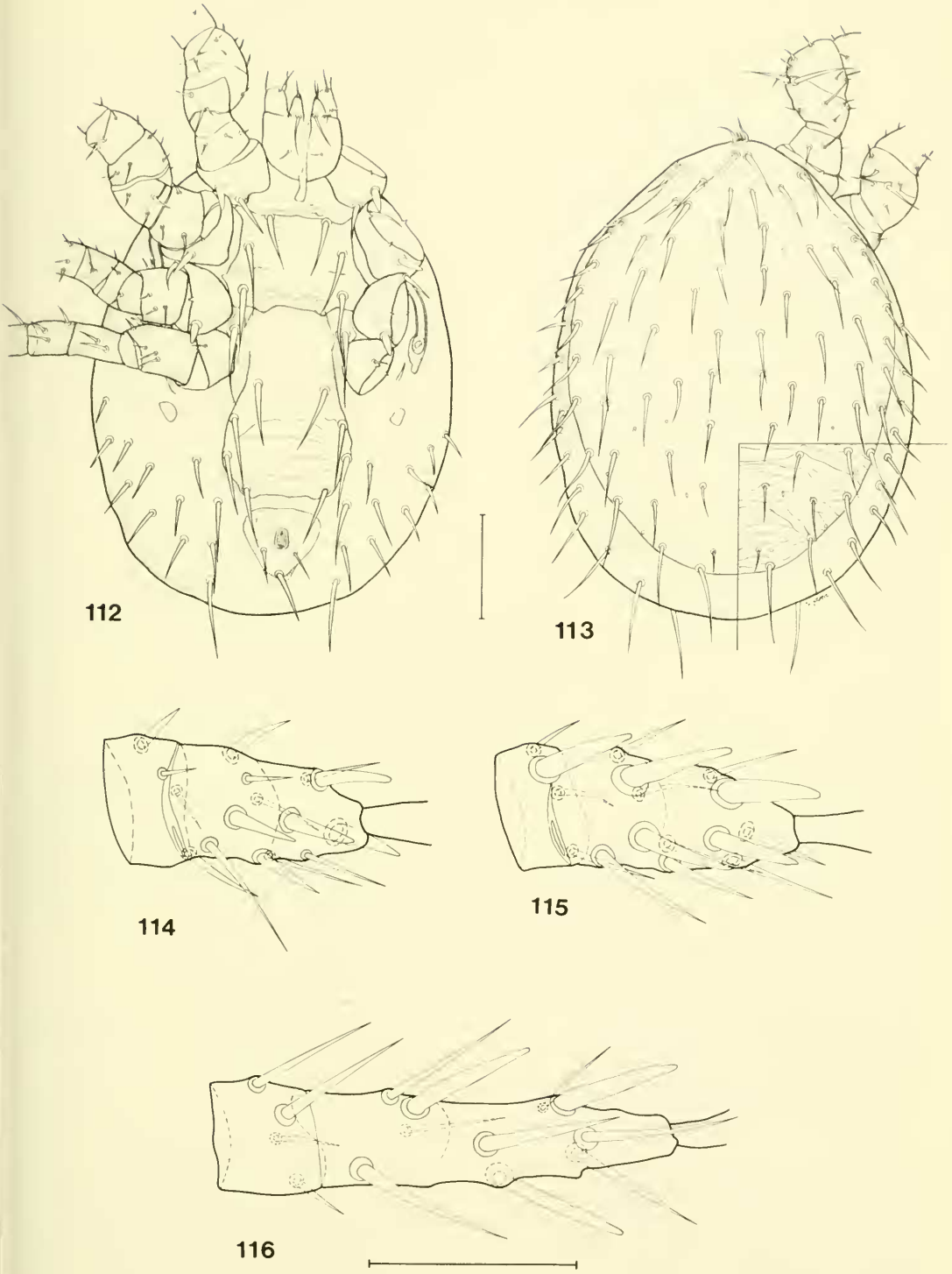
Dasymys incomptus
Congo (Brazzaville); Taufflieb, 1962

Lemniscomys striatus
Congo (Brazzaville); Taufflieb, 1962

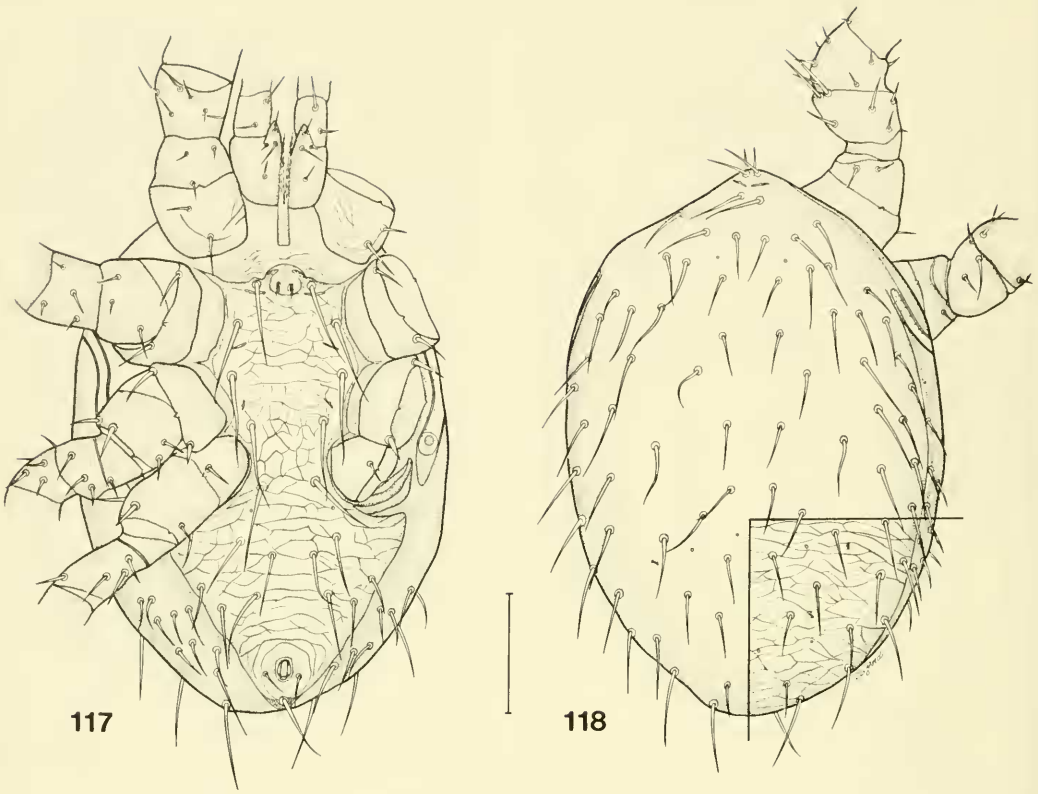
Lophuromys aguilus rita
Angola (Dundo); 1 female; Taufflieb, 1962

Lophuromys sikapusi
Congo-Leopoldville (Lwiro, Bukavu, Kivu); 2 females; Taufflieb, 1964

Mastomys natalensis
Congo-Leopoldville (Lwiro, Bukavu, Kivu); 2 females; Taufflieb, 1964



Figs. 112-116. *Laelaps brazzai* Taufflieb, female. (112) venter; (113) dorsum, scale = 100μ; (114) ventral view of tarsus II; (115) ventral view of tarsus III; (116) ventral view of tarsus IV, scale = 50μ.



Figs. 117-118. *Laelaps brazzai* Taufflieb, male. (117) venter; (118) dorsum, scale = 100μ.

Mus bella
Congo-Leopoldville (Lwiro, Bukavu, Kivu); 1 female; Taufflieb, 1964
Pelomys foxi
Congo-Leopoldville (Lwiro, Bukavu, Kivu); 1 female; Taufflieb, 1964
Praomys jacksoni
Angola (Dundo); 3 females; Taufflieb, 1962
Congo-Leopoldville (Lwiro, Bukavu, Kivu): 12 females; Taufflieb, 1964
Congo (Musoshi, Elizabethville, Haut-Katanga); 1 female; Taufflieb, 1964
Praomys tullbergi
Congo (Brazzaville); Taufflieb, 1962
Rattus frugivorus
Congo (Brazzaville); Taufflieb, 1962
Rattus verreauxi
South Africa (Citrusdal, Cape Prov.); 28 females, 15 males, 3 ny.; Taufflieb, 1964

Remarks.— *L. brazzai* may be distinguished from all other phenetically similar taxa by the following characters: posterior margin of sternal plate slightly invaginated medially between pair of rather prominent posterior projections posterior and medial to setae st. 3; genital plate somewhat narrower, greatest width at level of 3rd pair of setae rather than at level of 2nd pair; and dorsal setae Z5 rather long but J5 quite short, not reaching to posterior margin of dorsal plate.

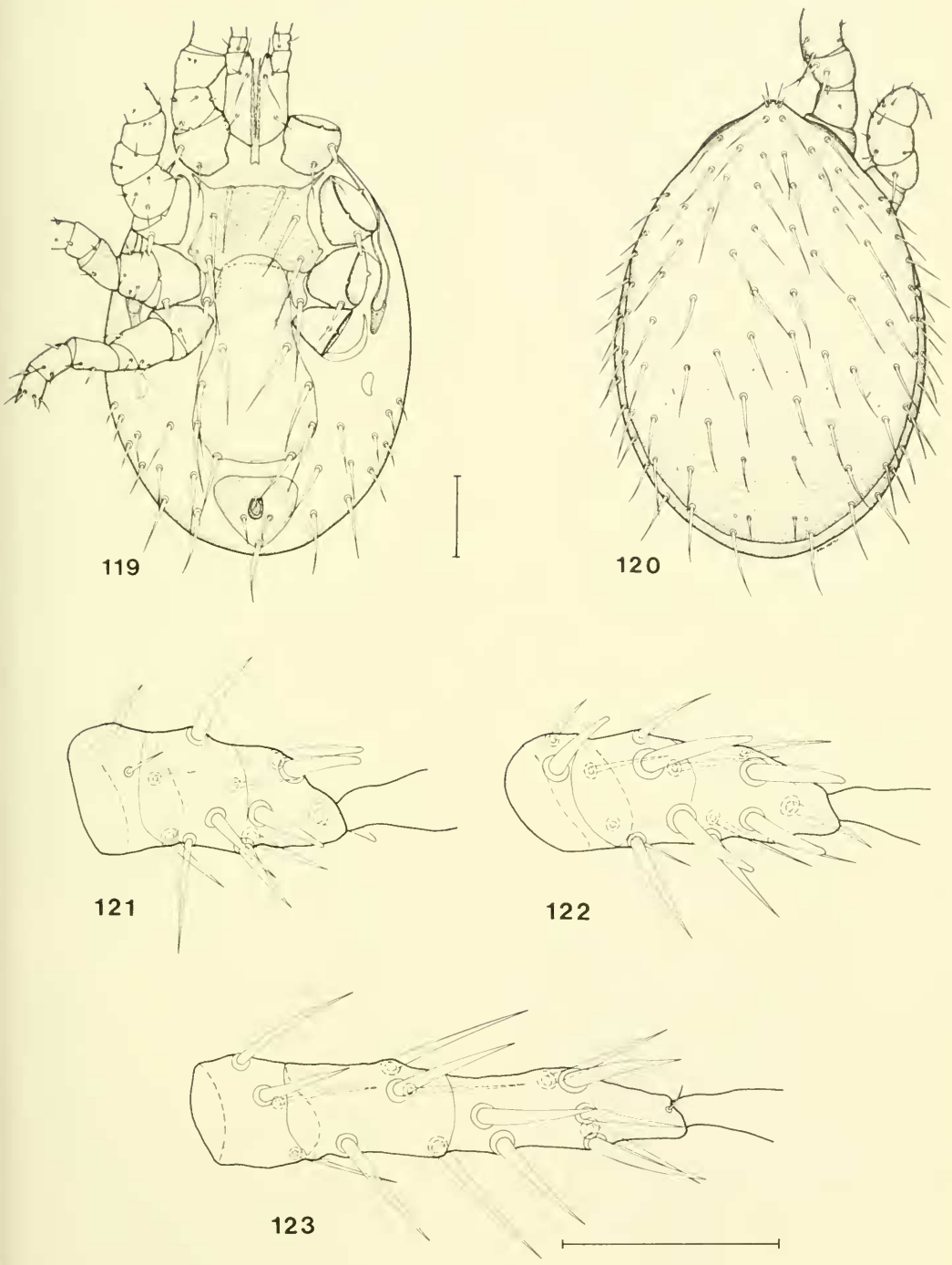
L. brazzai is recorded from a variety of different hosts by Taufflieb (1962, 1964). No collections of this taxon have yet been identified from the African Mammal Project material.

Laelaps (*Laelaps*) *myomys*, n. sp.

Figs. 119-125

Holotype, female; type locality: Sedhiou, Casmanee Region, Senegal; in U.S. National Museum, Washington, D.C.

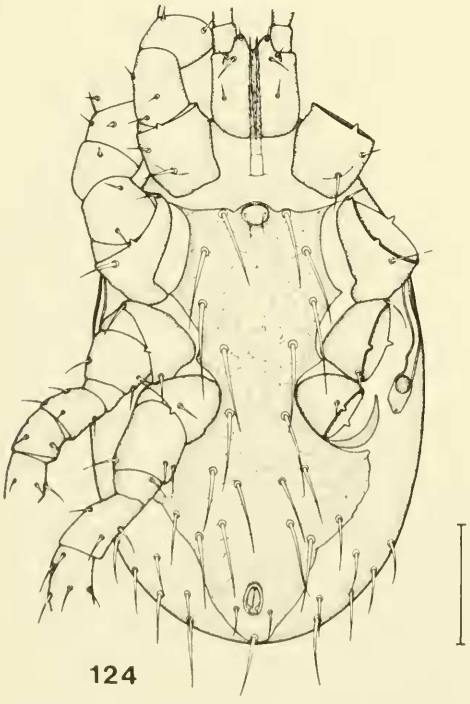
Description.— *Female*: (Figs. 119-123) Dorsal plate length 534 μ, width 378 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long, reaching to or almost to base of gnathosomal setae. Posterior margin of sternal plate slightly invaginated medially; setae st. 1 relatively long reaching almost to level of 3rd sternal setae; sternal setae as well as 4 pairs of genital setae rather long and slender, although somewhat robust basally. Anterior flap of genital plate overlapping posterior margin of sternal

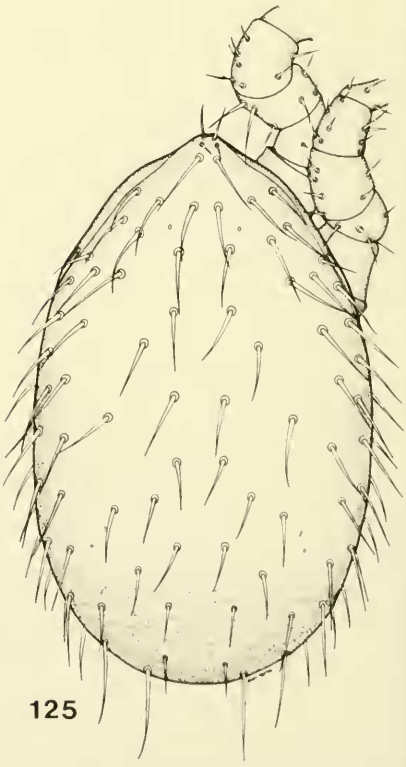


Figs. 119-123. *Laelaps myomys* n. sp., female. (119) venter; (120) dorsum, scale = 100μ; (121) ventral view of tarsus II; (122) ventral view of tarsus III; (123) ventral view of tarsus IV, scale = 50μ.

plate to level slightly anterior to 3rd sternal setae; distance between 1st genital setae subequal to or slightly less than distance between 4th genital setae; distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate roundly triangular to heartshaped, as wide as long, with rounded anterior lateral margins and slightly concave posterior margin; adanal setae of moderate length and slender, extending slightly beyond base of postanal seta; adanal setae set at level of posterior end of anal orifice; postanal seta rather long and robust. Unarmed venter bearing approximately 6 to 8 pairs of setaceous setae, some rather long with others rather short; metapodal plates of moderate size, irregularly elongate in shape. Peritreme extending to level of anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae slender and rather elongate, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching almost to posterior margin of dorsal plate. Eight to 10 pairs of setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I of moderate length and setaceous, yet somewhat robust, distal seta of coxa I quite robust and peglike; seta pd 1 of femur I distinctly longer than seta ad 1; anterior seta of coxae II and III of moderate length and setaceous but somewhat robust basally; seta of coxa IV shorter and setaceous; posterior seta of coxae II and III rather large, robust, and peglike; tarsus II with three robust, peglike preapical seta, tarsus III with two robust, peglike preapical setae with 2 or 3 pairs of peglike setae more proximal in position, and tarsus IV with 1 blunt peglike preapical seta; most other leg setae setaceous and normally developed.

Male: (Figs. 124-125) Gnathosomal and hypostomal setae slender and setaceous. Ventral setae, except adanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate broad between





Figs. 124-125. *Laelaps myomys* n. sp., male. (124) venter; (125) dorsum. scale = 100μ.

coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of slender setaceous setae; adanal setae of medium length, extending slightly beyond base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta considerably longer than adanal setae. Metapodal plates inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing 6 to 8 pairs of setaceous setae adjacent to holoventral plate. Peritreme extending to anterior of coxa II. Dorsal plate bearing 39 pairs of slender setaceous setae; anterior and lateral dorsal setae distinctly longer than posterior central setae. Soft integument of opisthosoma bearing approximately 6 to 8 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer and larger than small, slender distal seta; seta pd 1 of femur I somewhat longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous, with coxa IV seta somewhat smaller; posterior seta of coxa II long and setaceous, but posterior seta of coxa III shorter and more spinelike; no blunt, preapical setae on tarsi II, III, or IV; however, some tarsal setae may be rather robust and spinelike; most other leg setae setaceous and normally developed; however, some often shorter and spinelike.

TYPE MATERIAL

Myomys daltoni

Senegal: Sedhiou, Casamance Region: female holotype, male allotype, and 8 female paratypes (RMD 2385); 2 female paratypes (RMD 2386).

ADDITIONAL COLLECTION RECORDS

Nycteris macrotis

Gambia (Kudang): 1 female (RMD 2519-27); AMP

Tatera Kempii

Upper Volta (Fo): 1 female (REV 3755); AMP

Cricetomys gambianus

Upper Volta (Konankira): 1 female (REV 3279); AMP

Mastomys natalensis

Upper Volta (5 km. N. Boussouma): 1 female (REV 1545-46); AMP

Myomys daltoni

Gambia (Kudang): 4 females (RMD 2517); 1 female (RMD 2518); 1 female (RMD 2568); 1 female (RMD 2570); 1 female (RMD 2573); 1 female (RMD 2585); AMP

Ghana (Damongo, Northern Region): 1 female (TJM 1173); 1 female (TJM 1188); 1 female (TJM 1213); 1 female and 1 dny. (TJM 1220); 1 female (WPM 56); 1 female (WPM 69); 1 female (WPM 103); AMP

Ivory Coast (Tyenka): 4 females and 1 dny. (LWR 876); 1 male, 1 female and 1 dny. (LWR 878); (Bouna): 1 male and 1 female (LWR 1611); (Fetekro): 1 female (LWR 1679); 2 females (LWR 1680-81); 3 females (LWR 1682-84); 1 females (LWR 1691); 1 male and 3 females (LWR 1693); AMP

Nigeria (Panyam Fish Farm, Northern Region): 1 male and 3 females (HWS 4508); 2 males and 1 female (HJH 1588); (1 mi S Kabwira, Northern Region): 4 females (HWS 4588); 6 males and 7 females (HWS 4610); AMP

Senegal (6 km E Kaolack, Sine-Saloum Region): 1 female (RMD 1547); (Koussanar, Oriental Region): 1 female (RMD 1804); 2 females (RMD 1847); AMP

Upper Volta (Dio): 1 male and 4 females (REV 1710); 1 female (REV 1714); 1 female (REV 1843); (9 km NE Barga): 1 female (REV 1917); (6 km SE Sequenega): 5 females (REV 2330); (Ougarou): 5 females (REV 3049); 3 females (REV 3050); 1 female (REV 3057); 1 female (REV 3066); 1 female (REV 3067); (5 km SW Koutoura): 5 females (REV 4147); 1 female (REV 4148); 3 females (REV 4169); 2 females (REV 4170); 2 females (REV 4173); 4 females (REV 4190); 1 female (REV 4193); (Sideradougou): 2 females (REV 4271); (Djipologo): 1 female (REV 4414); AMP

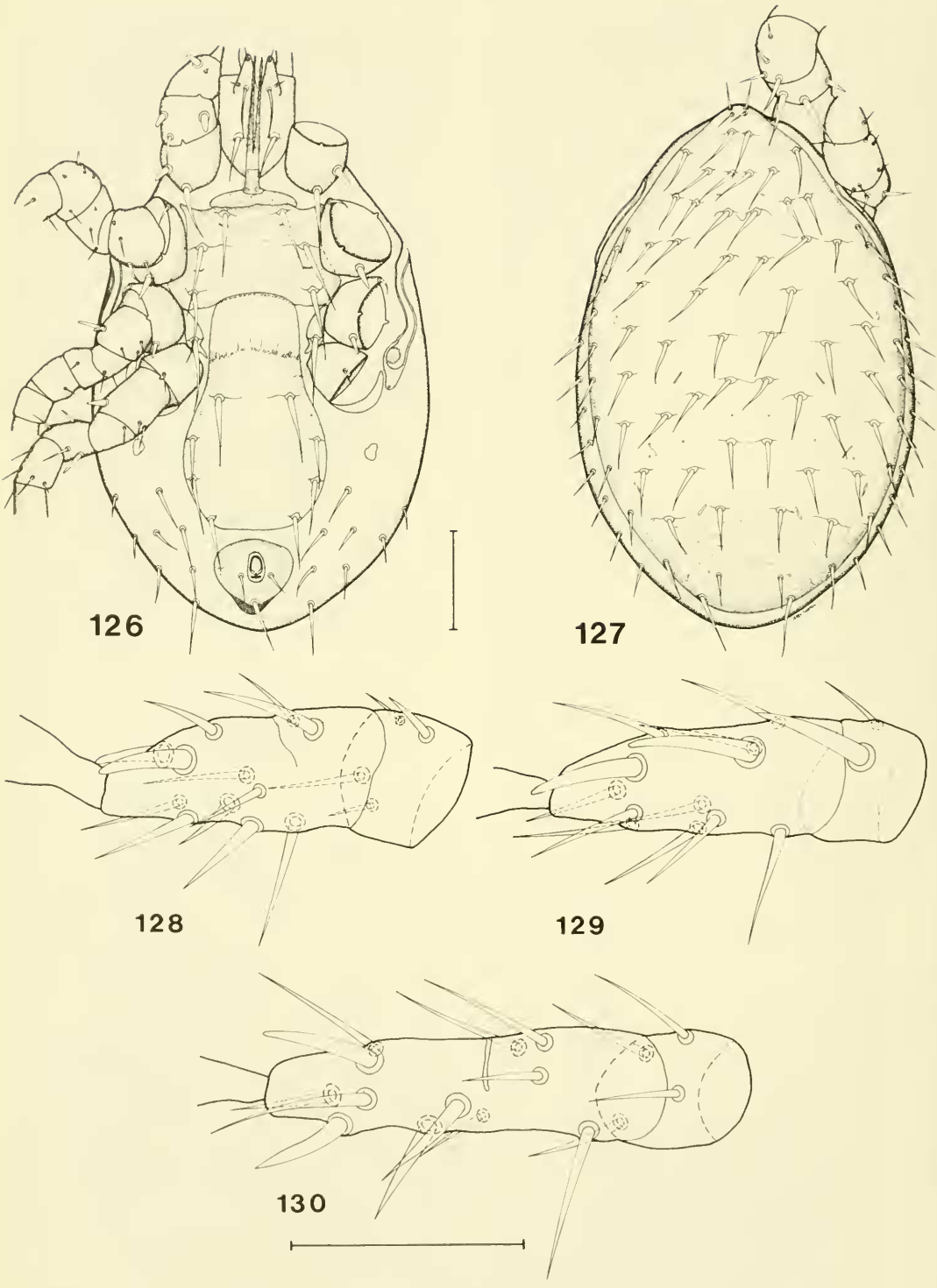
REMARKS.— *L. myomys* n. sp. differs from most other closely related taxa by the three blunt, peglike preapical setae on tarsus II rather than two such setae; however, it is similar to *L. brazzai* in this one character but differs in several others. This taxon is considerably smaller than other taxa of this subgroup, and it is easily separated from *L. brazzai* by the shape of the sternal plate, i.e., posterior margin only slightly invaginated without prominent posterior projections.

L. myomys has been collected only from northwest Africa south of the Sahara primarily on *Myomys daltoni*. Only a very few single collections are reported from other host species.

Laelaps (Laelaps) malacomys n. sp.

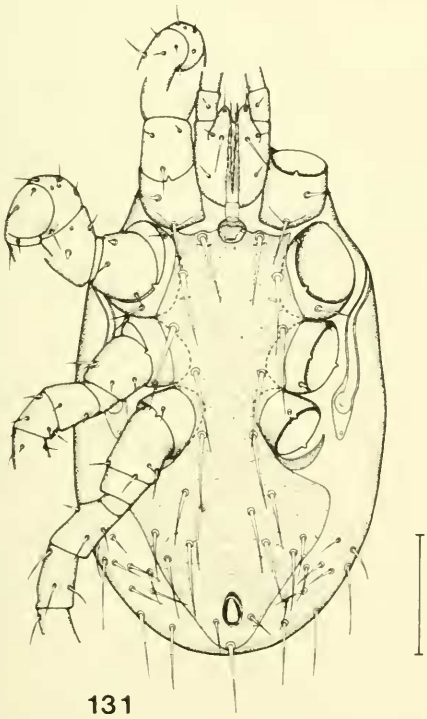
Figs. 126-132

Holotype, female: type locality: Belekoum, Ivory Coast; in U.S. National Museum, Washington, D.C.



Figs. 126-130. *Laelaps malacomys* n. sp., female. (126) venter; (127) dorsum, scale = 100μ; (128) ventral view of tarsus II; (129) ventral view of tarsus III; (130) ventral view of tarsus IV, scale = 50μ.

DESCRIPTION.— *Female*: (Figs. 126-130) Dorsal plate length 509 μ, width 339 μ. Gnathosomal setae rather long and quite robust basally; medial hypostomal setae quite long, slender, and setaceous, reaching distinctly beyond base of gnathosomal setae; other hypostomal setae smaller and setaceous. Posterior margin of sternal plate slightly invaginated, invagination extending no further than level of 3rd sternal setae; setae st. 1 of moderate length, reaching halfway between 2nd and 3rd sternal setae; sternal setae as well as 4 pairs of genital setae all of moderate length and setaceous. Anterior flap of genital plate slightly overlapping posterior margin of sternal plate; distance between 1st genital setae equal to distance between 4th genital setae; distance between 2nd genital setae subequal to distance between 3rd genital setae; greatest width of genital plate at both level of 2nd and 3rd genital setae. Anal plate roundly triangular, approximately as wide as long with anterior margin straight to slightly rounded; adanal setae very small, almost minute, yet somewhat robust; adanal setae set at level of posterior third of anal orifice; postanal seta much larger, robust, and spinelike to almost peglike. Unarmed venter bearing 10 to 12 pairs of mostly short, setaceous setae, some almost spinelike; metapodal plates irregularly oval, slightly longer than wide. Peritreme extending anteriorly to posterior of coxa I. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae of medium length; length usually no greater than distance between adjacent setae; subterminal setae (J5) of moderate length, extending to or slightly beyond posterior margin of dorsal plate. Approximately 10 pairs of setaceous setae bordering dorsal opisthosoma on soft integument. Proximal seta of coxa I rather long, robust, and spinelike; distal seta of coxa I quite short, robust, and peglike; a number of ventral setae of leg I short, robust, and peglike or spinelike; seta pd 1 and ad 1 of femur I subequal in length and rather robust; anterior seta of coxae II and III of moderate length, somewhat robust and spinelike; seta of coxa IV slender and setaceous; posterior seta of coxae II and III rather robust and peglike, with seta of coxa II considerably larger than that of



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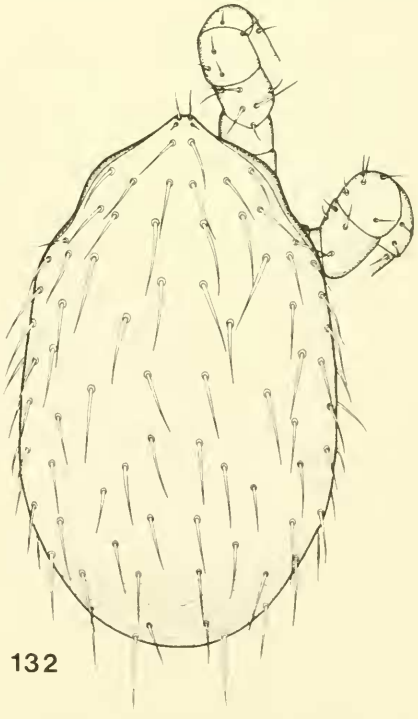

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Figs. 131-132. *Laelaps malacomys* n. sp., male. (131) venter; (132) dorsum, scale = 100μ.

coxa III; tarsi II, III, and IV each with 2 or 3 moderately robust, blunt, peglike setae; most other leg setae setaceous and normally developed; however, some ventral leg setae often short, robust, and spinelike or peglike as those on venter of leg I.

Male: (Figs. 131-132) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae long and slender reaching almost to base of gnathosomal setae; gnathosomal setae rather short and setaceous. Ventral setae, except adanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of slender, setaceous setae; adanal setae relatively short, extending to or slightly beyond base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta at least twice as long as adanals and slender. Metapodal plate inapparent, apparently fused to lateral extensions of holoventral plate; unarmed venter bearing approximately 8 pairs of setaceous setae adjacent to holoventral plate. Peritreme extending to level of anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; dorsal setae all of moderate length, each extending to or slightly beyond base of adjacent posterior seta; subterminal setae (J5) of medium length, extending well beyond posterior margin of dorsal plate. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; seta pd 1 of femur I slightly longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV of medium length and setaceous; posterior seta of coxa II of medium length and setaceous, but enlarged basally; posterior seta of coxa IV short, relatively robust, and spinelike; preapical setae of tarsi II and III may be somewhat enlarged and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and somewhat spinelike.

Type material

Malacomys edwardsi

Ivory Coast (Belekoum); female holotype (LWR 573); male allotype, and 9 female paratypes (LWR 583); 1 female paratype (LWR 584); AMP

Additional collection records

Hipposideros commersoni

Ivory Coast (Yabrasso); 1 female (LWR 1528); AMP

Aethomys chrysophilus

Rhodesia (20 mi N Salisbury, Mashonaland); 1 female (SWG 1747); AMP

Lemniscomys striatus

Ivory Coast (Fetekro); 1 female (LWR 1739); AMP

Mus setulosus

Ivory Coast (Kahin); 1 female (LWR 763); AMP

Malacomys edwardsi

Ghana (Adamso, Ashant Region); 2 females (TJM 1136); AMP

Ivory Coast (10 mi WNW Soubre); 3 females (LWR 1443); 2 females (LWR 1449); 4 females (LWR 1451); 1 female (LWR 1475); 23 females and 2 males (LWR 1477); (Niebe); 17 females (JWL 3061); AMP

Malacomys longipes

Ghana (Adamso, Ashant Region); 1 female (WPM 12); AMP

Ivory Coast (10 mi WNW Soubre); 4 females (LWR 1450); 1 female (LWR 1452); 19 females (LWR 1460); 13 females (LWR 1462); 2 females (LWR 1476); 4 females (LWR 1478); 5 females (LWR 1479); (Niebe); 10 females (JWL 3049); 4 females (JWL 3060); 7 females (JWL 3070); AMP

Remarks.— *L. malacomys* is tentatively placed in subgroup C of major group II; however, it differs in several major characters: gnathosomal setae robust and longer than medial hypostomal setae; proximal seta of coxa I robust and long; some ventral leg setae short, blunt, and peglike, especially on leg I; dorsal setae more robust than normal; and peritreme longer, extending anteriorly to posterior of coxa I. In the numerical taxonomic analysis *L. malacomys* clustered with subgroup B of major group III because of the similar robust body setae; however, it is most similar to taxa of major group II in other prominent characters, such as the form of the setae of coxa I (blunt, peglike distal seta and elongate, setaceous proximal seta).

This mite parasitized *Malacomys* species, with but few exceptions, in northwest Africa south of the Sahara. Single collections have been made from several other host species.

Major Group III

The six taxa of this major group are characterized by the presence of two

blunt, peglike setae (both proximally and distally) on coxa I. Even though these species share this one character in common, they form a rather diverse group, differing from each other in many morphological characters.

Subgroup A

The two taxa of this subgroup (*L. vansomereni* and *L. acomys*) differ from subgroup B in having simple, setaceous gnathosomal setae rather than robust, spinelike or peglike gnathosomal setae. *L. vansomereni* and *L. acomys* differ from each other in several significant characters: the shape of the sternal plate differs greatly, as well as the shape of the anal plate.

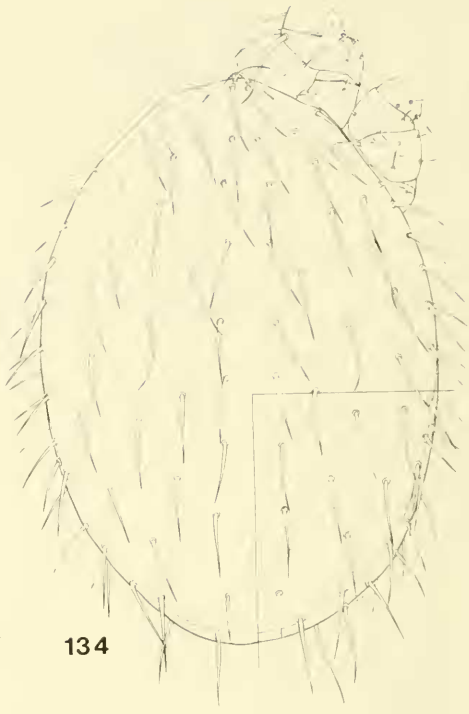
Laelaps (*Laelaps*) *vansomereni* Hirst

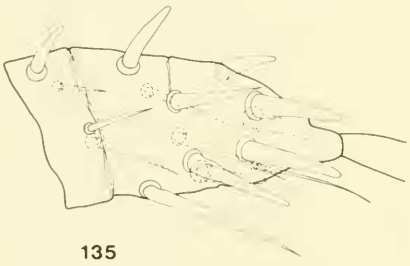
Figs. 133-139

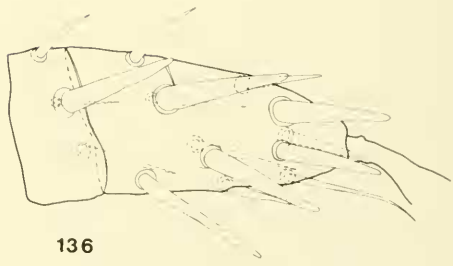
Laelaps vansomereni Hirst, 1923, Ann. Nat. Hist. 12(67):690. (Holotype: Busui, S. Bugishu, Uganda: British Museum [Natural History], London); Hirst, 1925, Proc. Zool. Soc. Lond. 4:55; Zumpt, 1950, S. Afr. J. Med. Sci. 15: 78; Radford, 1950, Parasitology 40(304):369; Keegan, 1956, J. Egypt. Publ. Hlth. Assoc. 31(6):256; Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):284-285.

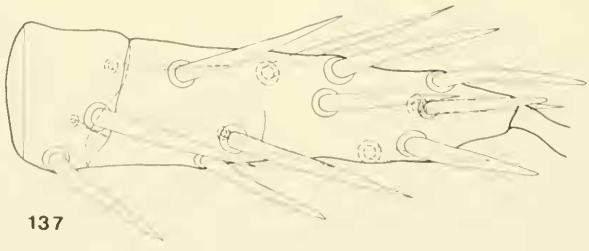
DESCRIPTION.— *Female*: (Figs. 133-137) Dorsal plate length 656 μ, width 466 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching only about half distance to gnathosomal setae. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 of moderate length, reaching about halfway between setae st. 2 and st. 3. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly if at all; distance between 1st genital setae distinctly less than distance between 4th genital setae, and distance between 2nd genital setae slightly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd pair of genital setae. Anal plate somewhat broadly oval in general shape, width greater than length, with margins broadly rounded; adanal setae rather robust and spinelike, length extending well beyond base of postanal seta; anal orifice located near anterior margin of anal plate, with adanal setae set about halfway between anal orifice and postanal seta; postanal seta distinctly longer than adanal seta and relatively robust. Unarmed venter bearing approximately 18 pairs of mostly setaceous setae, 6 pairs adjacent to genital and anal plates plus approximately 10 to 12 pairs near or on posteriolateral body margins; metapodal plates generally oval in shape. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous setae; most dorsal setae relatively long, length equal to or slightly greater than distance between adjacent setae; subterminal setae (J5) reaching to or slightly beyond posterior margin of dorsal plate. About 12 pairs of setae bordering dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I enlarged, robust, and peglike, with proximal seta considerably more robust than distal seta; setae pd 1 and ad 1 of femur I usually subequal in length; anterior seta of coxae II and III and seta of coxa IV setaceous, yet somewhat robust basally; posterior seta of coxae II and III greatly enlarged, robust, and peglike; tarsi II, III, and IV each with 3 or 4 blunt, robust, preapical setae; most other leg setae setaceous and normally developed, some often rather spinelike.

Male: (Figs. 138-139) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long and slender, each extending well beyond base of adjacent posterior seta; holoventral plate rather broad between coxae II and III, quite narrow between coxae IV, and moderately expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of medium length, extending almost to base of postanal seta; adanal setae set at level near middle of anal orifice; postanal seta rather slender and setaceous, and only slightly longer than adanal setae; unarmed venter bearing approximately 12 to 15 pairs of setaceous setae adjacent to holoventral plate, all rather slender with more posterior and marginal setae longer. Metapodal plates rather elongate. Peritreme extending to middle of coxa I. Dorsal plate bearing 39 pairs of setaceous

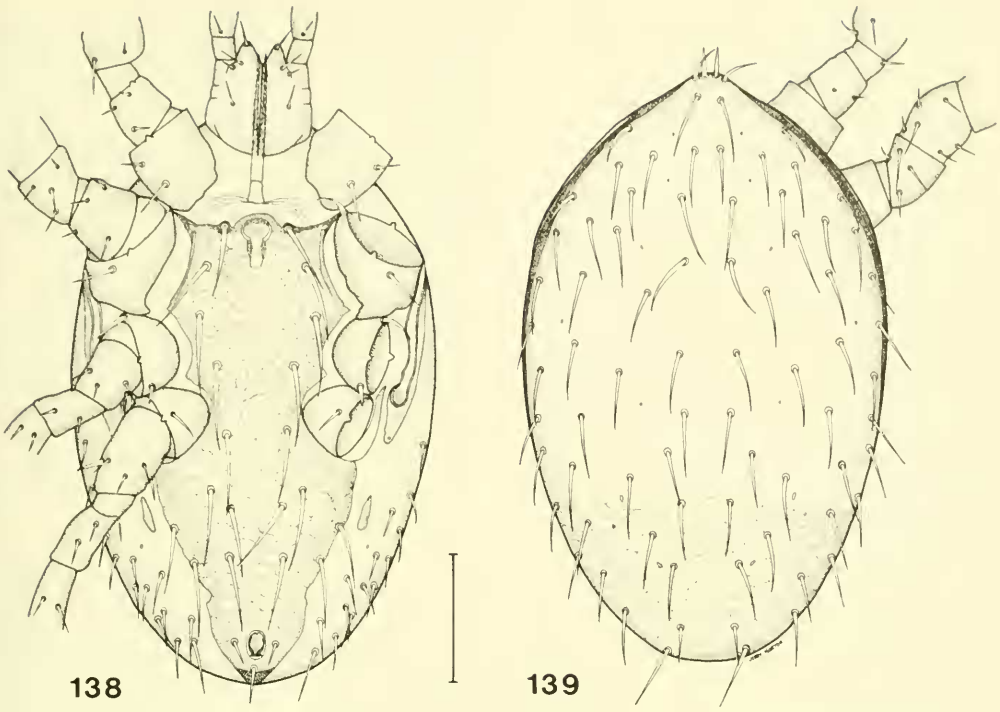








Figs. 133-137. *Laelaps vansomereni* Hirst, female. (133) venter; (134) dorsum, scale = 100μ; (135) ventral view of tarsus II; (136) ventral view of tarsus III; (137) ventral view of tarsus IV, scale = 50μ.



Figs. 138-139. *Laelaps vansomereni* Hirst, male. (138) venter; (139) dorsum, scale = 100μ.

setae; length and postion of setae approximately as in female. Soft integument of opisthosoma bearing approximately 6 to 8 pairs of setaceous setae. Both proximal and distal setae of coxa I setaceous, proximal seta considerably longer and much more robust than slender, shorter distal seta; setae pd 1 and ad 1 of femur I rather short and robust, with ad 1 seta somewhat longer than pd 1 seta; anterior seta of coxae II and III of medium length, rather robust, and spinelike; posterior seta of coxa II of medium length and somewhat setaceous, slightly robust; posterior seta of coxae III short, robust, and spinelike; and seta of coxae IV shorter and much more setaceous; 3 preapical setae of tarsus II short, robust, and peglike; some other seta of tarsi II and III shorter, somewhat robust, and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

COLLECTION RECORDS

Elephantulus intufi
South Africa; 2 coll. (8 females); AMP

Suncus etruscus
Southern Africa; Zumpt, 1961

Suncus varilla
Southern Africa; Zumpt, 1950

Rhinolophus elivosus
South Africa; 1 coll. (6 females); AMP

Cryptomys hottentotus
South Africa; 1 coll. (2 females); AMP

Gerbillus paeba
Botswana; 1 coll. (1 female); AMP

Tatera leucogaster
South Africa; 2 coll. (11 females. 1 male, 2 ny.); AMP

Tatera afra
Southern Africa; Zumpt, 1961

Aethomys chrysophilus
Rhodesia (Bulawayo); Zumpt, 1950
Rhodesia; 22 coll. (127 females. 1 ny.); AMP
South Africa (Pretoria, Transvaal); Zumpt, 1950
South Africa (Mfongos, Zululand): Hirst, 1925
South Africa (Vaalwater, Nylstroom Transvaal); Taufflieb, 1964
South Africa (Naboomspruit, Transvaal); Taufflieb, 1964
South Africa (ORS); 1 coll. (18 females); AMP
South Africa; 50 coll. (308 females, 4 males); AMP

Aethomys namaquensis
Southern Africa; Zumpt, 1950

Aethomys selindensis
Rhodesia; 4 coll. (38 females); AMP

Dasymys helukus
Uganda (Kampala); Tipton, 1960

Lemniscomys griselda
South Africa; 1 coll. (3 females); AMP
Mastomys coucha
Southern Africa; Zumpt, 1950
Sudan (Torit, Equatoria); 1 female; Keegan, 1956
Mastomys natalensis
Rhodesia; 1 coll. (1 female); AMP
South Africa; 17 coll. (40 females, 2 males, 11 ny.); AMP
Southern Africa; Zumpt, 1961
Rhabdomys pumilio
South Africa; 5 coll. (5 females); AMP
Saccostomus campestris
Southern Africa; Zumpt, 1950
South Africa (ORS); 1 coll. (1 female); AMP
South Africa; 1 coll. (1 female); AMP
"Rodent"
Uganda (Busiu, So. Bugishu); Hirst, 1923
Uganda (Bumungi, Bugwe); Hirst, 1925
"Rats"
Kenya (Okwara's Camp); Hirst, 1925
Unknown host
Rhodesia; 1 coll. (1 female); AMP
South Africa; 14 coll. (25 females, 1 male, 2 ny.); AMP

Remarks.— *L. vansomereni* may be separated from all other taxa of major group III by the following characters: gnathosomal and hypostomal setae setaceous; genital plate quite broad throughout with 1st genital setae considerably closer together than 4th pair; anal plate wider than long; and adanal setae robust and spinelike.

This taxon has been recorded from a variety of different hosts in southern Africa, with more collections from *Aethomys* species and *Mastomys* species than from all others.

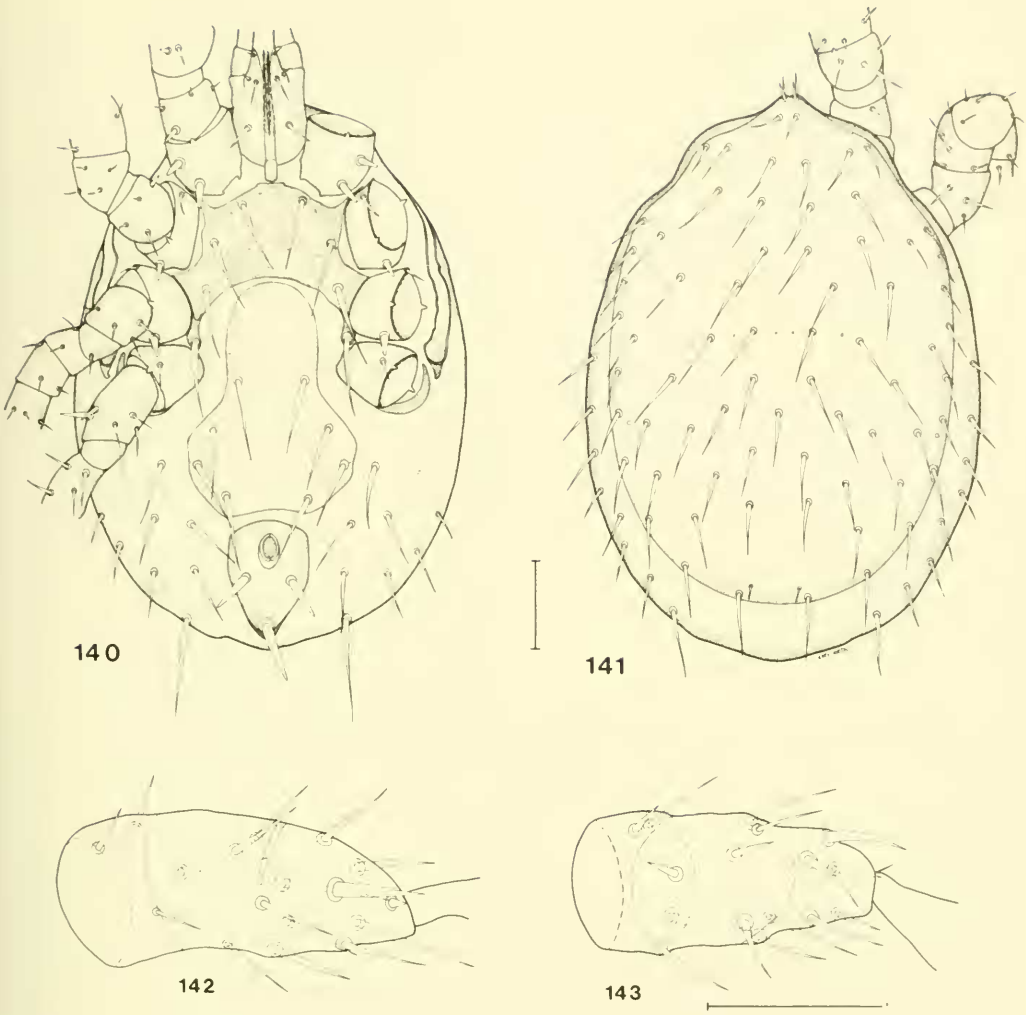
Laelaps (*Laelaps*) *acomys* n. sp.

Figs. 140-145

Holotype, female; type locality: Dunblaine, Manicaland, Rhodesia; in U.S. National Museum, Washington, D.C.

Description.— *Female*: (Figs. 140-143) Dorsal plate length 574 μ, width 421 μ. Gnathosomal and hypostomal setae setaceous; medial hypostomal setae medium length, extending slightly half distance to gnathosomal setae; gnathosomal setae of medium length and rather robust. Posterior margin of sternal plate considerably invaginated, distinctly beyond level of 3rd sternal setae; anterior margin of sternal plate arched considerably; setae st. 1 extending to invaginated posterior margin of sternal plate; sternal setae as well as 4 pairs of genital setae relatively long and somewhat robust. Anterior flap of genital plate not reaching to posterior margin of sternal plate; distance between 1st genital setae distinctly less than distance between 4th genital setae; distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level slightly anterior to 3rd pair of genital setae. Anal plate elongate, distinctly longer than wide; adanal setae of moderate length but very robust and spinelike; postanal seta somewhat longer and equally robust and spinelike; adanal setae set at level somewhat posterior to anal orifice. Unarmed venter bearing 6 pairs of setaceous setae, anteriormost 5 pairs of moderate length, and single posterior pair quite long and slender; metapodal plates small, oblong-oval. Peritreme extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setaceous, rather robust setae; most dorsal setae of medium length, length slightly less than distance between adjacent setae; subterminal setae (J5) quite small, not reaching to posterior margin of dorsal plate. Nine pairs of medium length setaceous setae border dorsal opisthosoma on soft integument. Proximal and distal setae of coxa I rather large, robust, and peglike; one seta on venter of femur I rather robust and spinelike; seta pd 1 of femur I somewhat longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV setaceous; posterior seta of coxae II and III rather large, robust, and peglike; coxae II and III each with one slightly robust, spinelike seta; most other leg setae setaceous and normally developed; however, some, particularly femur of each leg, often shorter and somewhat spinelike.

Male: (Figs. 144-145) Gnathosomal and hypostomal setae setaceous; medial hypostomal setae of moderate length, reaching slightly more than half distance to base of gnathosomal setae; gnathosomal setae short, setaceous. Ventral setae, except adanal and postanal setae, rather long and somewhat robust, each extending well beyond base of adjacent posterior seta; holoventral plate broad between coxae II and III, narrowing considerably between coxae IV, and considerably expanded posterior to coxae IV; expanded area between genital setae and anal orifice



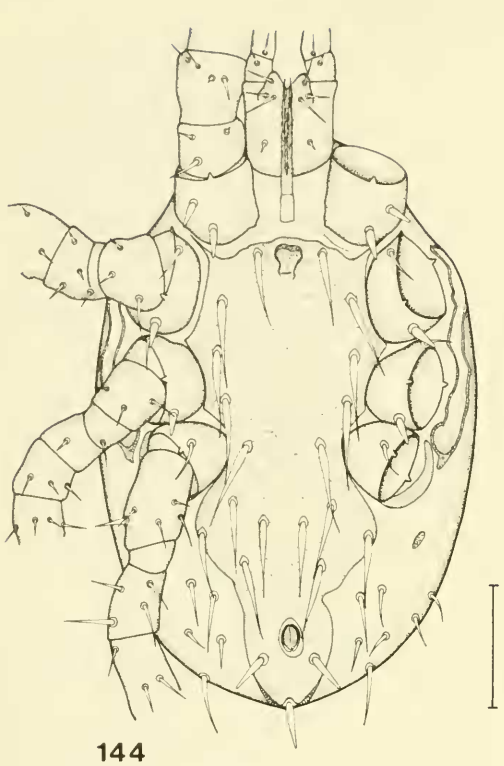
Figs. 140-143. *Laelaps acomys* n. sp., female. (140) venter; (141) dorsum, scale = 100μ; (142) ventral view of tarsus II; (143) ventral view of tarsus III, scale = 50μ.

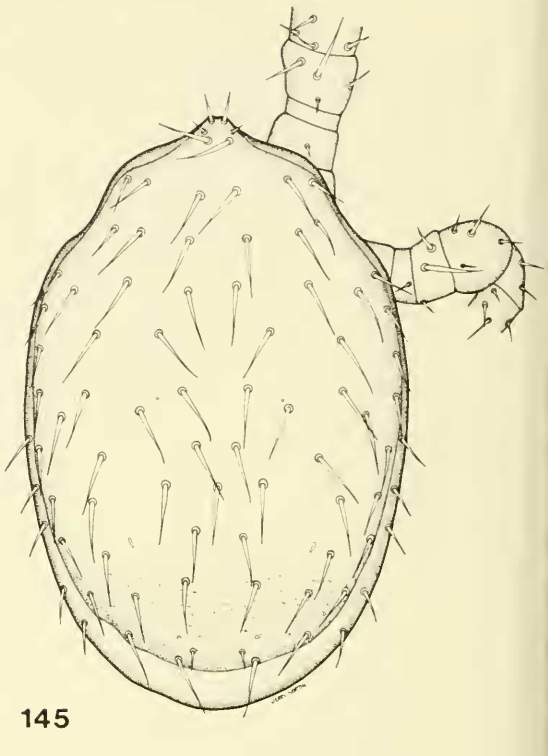
bearing 4 pairs of setaceous setae; adanal setae of medium length and quite robust and spinelike; postanal seta somewhat longer but equally as robust and spinelike; adanal setae set at level somewhat posterior to anal orifice. Metapodal plates small and oval. Unarmed venter bearing 5 or 6 pairs of setaceous setae adjacent to holoventral plate, 2 pairs considerably longer than others. Peritreme extending to anterior of coxa II and rather broad throughout. Dorsal plate with 31 pairs of setaceous setae; length and position of setae approximately as in female. Soft integument of opisthosoma bearing approximately 6 pairs of setaceous setae. Proximal and distal setae of coxa I rather robust and peglike; seta pd 1 of femur I slightly longer than seta ad 1; anterior seta of coxae II and III and seta of coxa IV slender and setaceous; posterior seta of coxae II and III rather robust and peglike; one preapical seta of tarsi II and III somewhat robust and spinelike; most other leg setae setaceous and normally developed; however, some, particularly on femora, often short and spinelike.

TYPE MATERIAL

Acomys spinosissineus

Rhodesia (Dunblaine, Manicaland); female holotype, male allotype, 8 female paratypes (SWG 2120-22); 8 female paratypes (SWG 2129); AMP





Figs. 144-145. *Laelaps acomys* n. sp., male. (144) venter; (145) dorsum, scale = 100μ.

ADDITIONAL COLLECTION RECORDS

Acomys spinosissineus

Rhodesia (3 mi NE Mt. Selinda, Farfell Farm, Manicaland): 2 females (HWS 5406-58); 1 female HWS 55486-87); 1 female (HWS 5470); (Chirinda Forest, Manicaland) 3 females (HWS 5293); 2 females (SWG 1560); (Nyamkarara River, Manicaland) 7 females (SWG 1899-1900); 5 females (SWG 1901-03); 3 females (SWG 1946-49); 7 females (SWG 1968-72); (Ngorima Reserve [East]; Manicaland) 11 females (SWG 2147-49); 9 females (SWG 2158-61); 7 females (SWG 2174-76); 5 females (SWG 2176-78); AMP

Unknown host

Rhodesia; 1 female (SWG 2181); AMP

REMARKS.— *L. acomys* differs from all other *Laelaps* species in several unique characters: anterior margin of sternal plate strongly arched; posterior margin of sternal plate deeply invaginated; anal plate distinctly longer than wide; and adanal setae and postanal setae robust and spinelike or peglike.

This species is known only from *Acomys spinosissineus* in Rhodesia. It no doubt occurs on this host throughout southern Africa.

Subgroup B

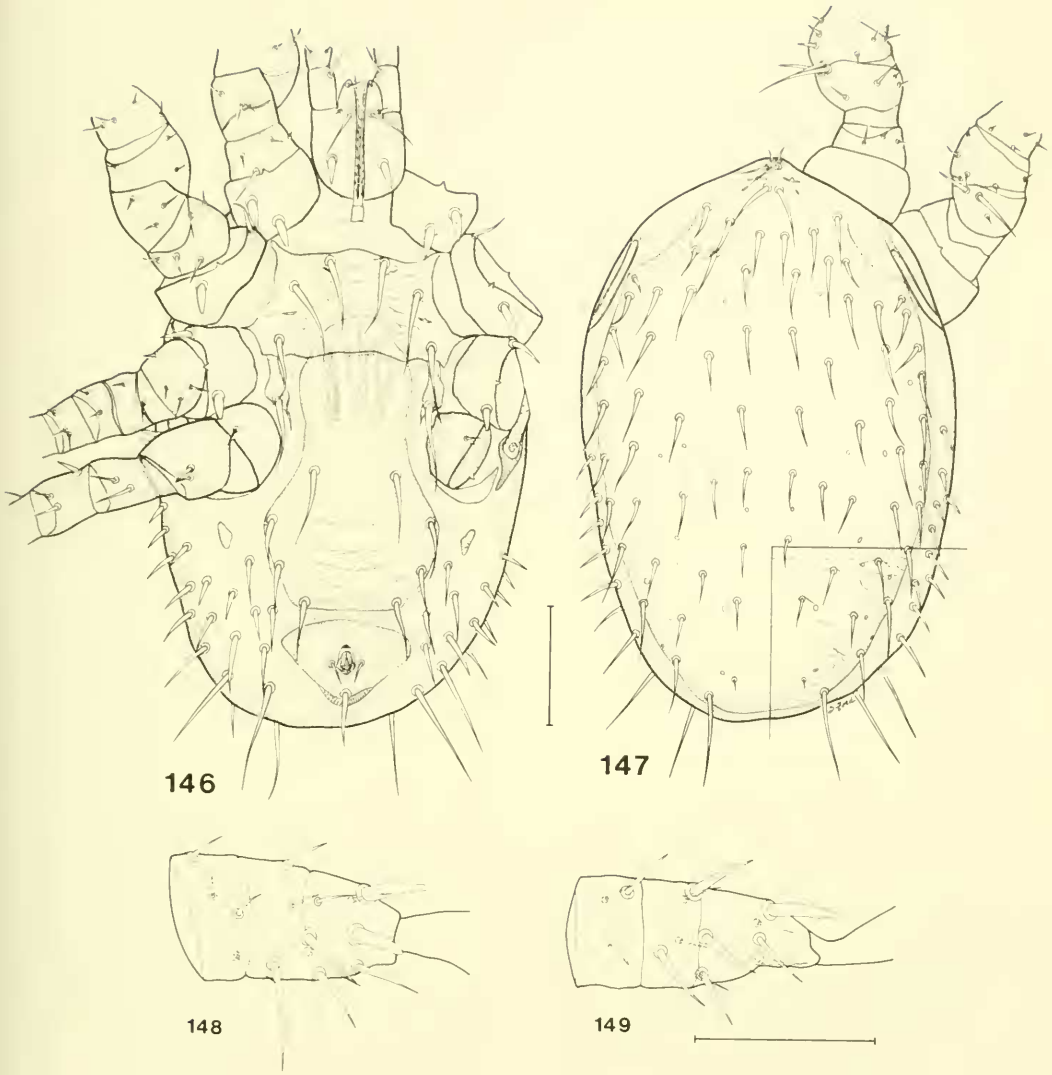
The four species of this subgroup (*L. paraspinosus*, *L. bocquieri*, *L. spinifer*, and *L. breviperitremus*) all bear robust, spinelike or peglike gnathosomal setae, but share few other characters in common. This is a rather diverse group in many morphological characters; however, most clustered together in the numerical taxonomic analysis.

Laelaps (*Laelaps*) *spinifer* Taufflieb and Mouchet

Figs. 146-149

Laelaps spinifer Taufflieb and Mouchet, 1956, Ann. Parasit. 31(3):302 (Holotype: Yaounde, French Cameroon; Institut Pasteur, Paris); Tipton, 1960, Univ. Calif. Publ. Ent. 16(6): 282.

DESCRIPTION.— *Female*: (Figs. 146-149) Dorsal plate length 438 μ, width 285 μ. Gnathosomal setae short, robust, and peglike; medial hypostomal setae long, extending at least to base of gnathosomal setae; other two pairs of hypostomal setae short, setaceous. Posterior margin of ster-



Figs. 146-149. *Laelaps spinifer* Taufflieb and Moucheti, female. (146) venter; (147) dorsum, scale = 100μ; (148) ventral view of tarsus II; (149) ventral view of tarsus III, scale = 50μ.

nal plate irregular and only slightly invaginated medially; setae st. 1 of moderate length, reaching to level of setae st. 3 but not to posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior one-third of sternal plate; distance between 1st genital setae slightly less than distance between 4th genital setae, distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd pair of genital setae. Anal plate broadly triangular, considerably wider than long, with rounded anterior margins; adanal setae of medium length, extending to or almost to base of postanal seta; adanal setae set at level of posterior third of anal orifice; postanal seta somewhat longer than adanals and rather robust and spinelike. Unarmed venter bearing 10 to 15 pairs of rather robust setae, 5 or 6 pairs immediately adjacent to genital and anal plates, and 5 to 10 pairs near or on posterior lateral body margins; metapodal plates elongate-oval, about twice as long as wide. Peritreme

extending to level of middle or anterior of coxa II. Dorsal plate bearing 39 pairs of setae, more anterior and lateral setae somewhat robust, setae i1 and r4 rather small and spinelike, and subterminal setae (J5) very small and setaceous; terminal setae (Z5) longer than any other dorsal setae. Eight to 10 pairs of setae border dorsal opisthosoma on soft integument, anterior-most setae short and spinelike, with posteriormost setae longer and more setaceous. Both proximal and distal setae of coxa I very robust, blunt, and peglike; seta pd 1 of femur I somewhat longer than ad 1; anterior seta of coxae II and III somewhat enlarged and spinelike; posterior seta of coxae II and III quite robust, blunt, and peglike; seta of coxa IV small and setaceous; tarsus II with two blunt preapical setae, tarsus III with one blunt preapical seta, and tarsus IV with several somewhat spinelike preapical setae; most other leg setae setaceous and normally developed.

Collection records

Arvicanthis rufinus
French Cameroon (Yaounde); 6 females; Taufflieb and Mouchet, 1956

Lophuromys aquilus
Congo-Leopoldville (Lwiro, Kivu); 2 females; Taufflieb, 1964

Lophuromys sikapusi
French Cameroon (Yaounde); Zumpt, 1961

Remarks.— *L. spinifer* possesses a number of short, spinelike setae ventrally and laterally posterior to coxae IV. It may be distinguished from other taxa by the robust, spinelike gnathosomal setae; posterior margin of the sternal plate irregularly straight; anal plate unusually wide, broadly triangular in general shape; rather long Z5 setae but with tiny J5 setae; and rather short posterior central dorsal setae.

L. spinifer has been collected from two *Lophuromys* species and *Arvicanthis rufinus* in French Cameroon and Congo-Leopoldville.

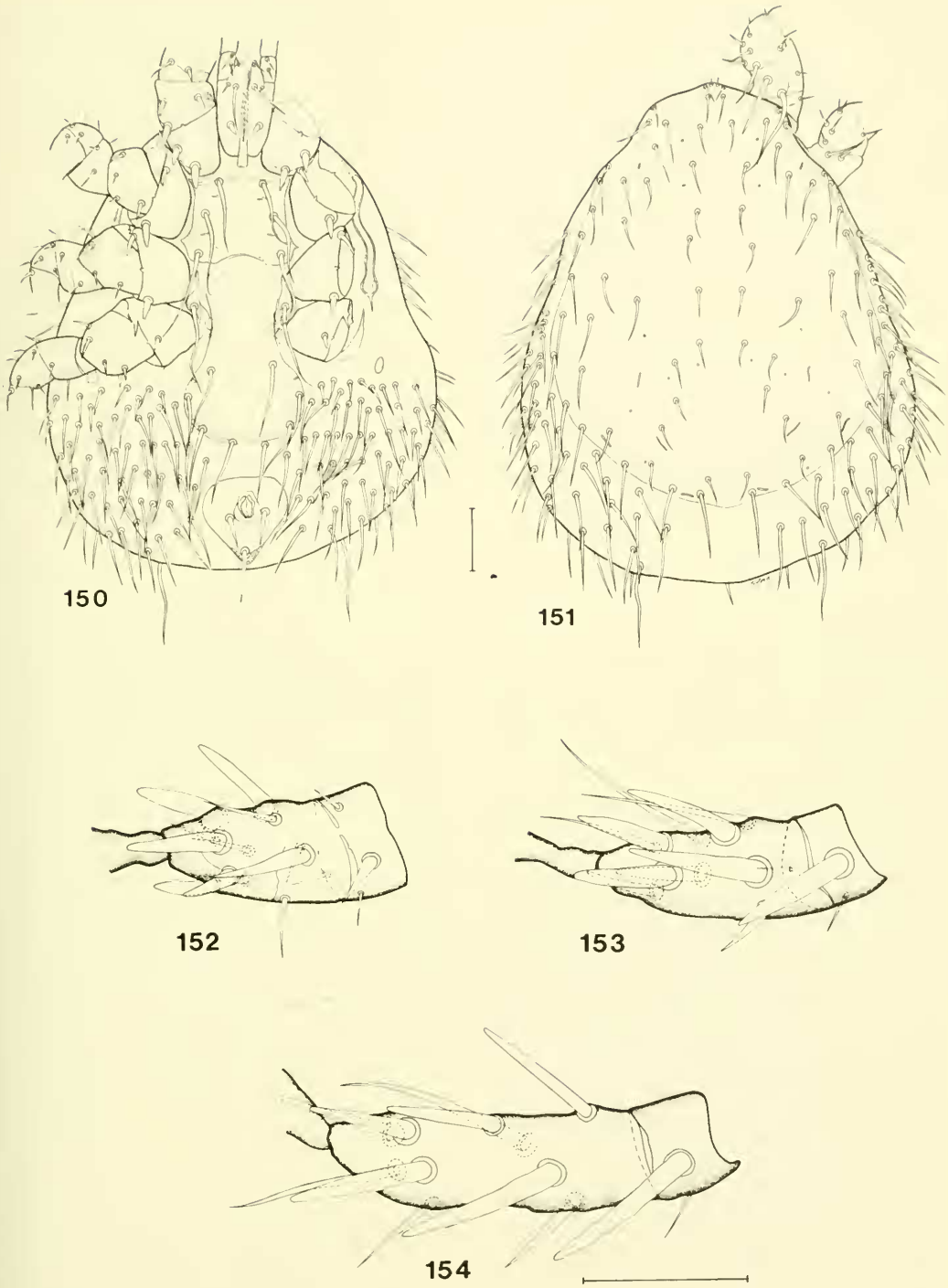
Laelaps (*Laelaps*) *paraspinosus* Tipton

Figs. 150-156

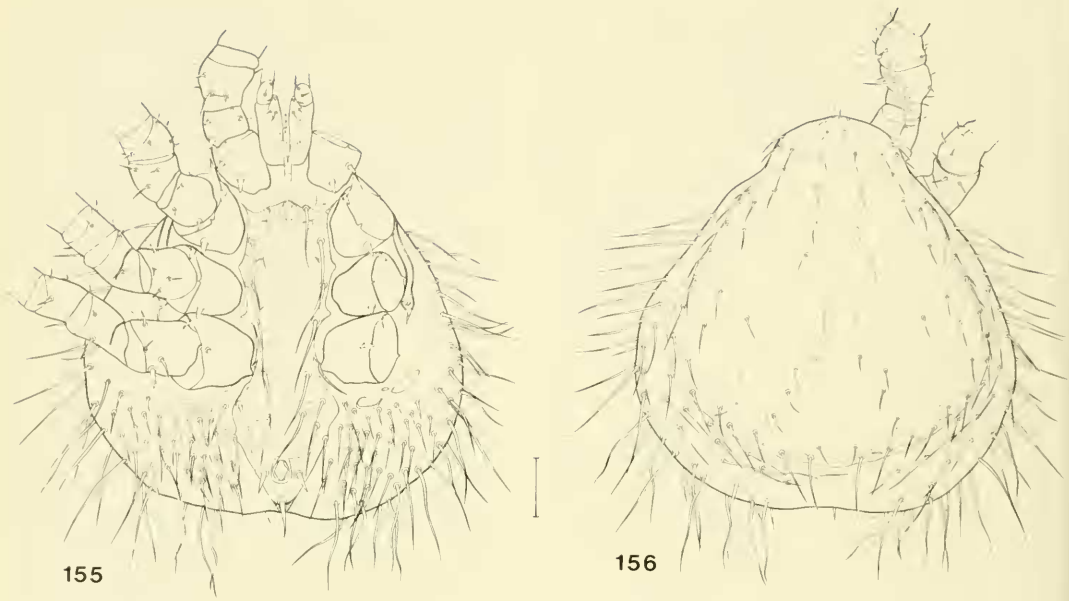
Laelaps parvulus Hirst (not Berlese, 1904 or Berlese, 1910), 1923, Ann. Nat. Hist., 12(67): 691 (Holotype: South Africa; British Museum [Natural History], London).

Laelaps paraspinosus Tipton, 1960, Univ. Calif. Publ. Ent. 16(6):278-280.

Description.— *Female*: (Figs. 150-154). Dorsal plate length 543 μ, width 530 μ. Gnathosomal setae stout, robust, and spinelike to peglike; hypostomal setae setaceous, with medial hypostomal setae long, reaching to beyond base of gnathosomal setae. Posterior margin of sternal plate somewhat invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 rather long, reaching almost to posterior margin of sternal plate. Anterior flap of genital plate overlapping posterior margin of sternal plate only slightly if at all; distance between 1st genital setae distinctly greater than distance between 4th genital setae, and distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at or slightly posterior to level of 2nd pair of genital setae. Anal plate roundly triangular, as wide as long, with anterior margins rounded; adanal setae robust and spinelike and of moderate length, extending almost to base of postanal seta; adanal setae set at level near posterior end of anal orifice; postanal seta somewhat longer than adanal setae and rather robust. Unarmed venter bearing approximately 50 pairs of mostly setaceous setae, some more anterior setae rather short and stout with more posterior setae much longer. Metapodal plates oval. Peritreme extending to level of middle of coxa II. Dorsal plate bearing 38 pairs of setaceous setae, setae px3 absent; most dorsal setae of medium length, length slightly less than distance between adjacent setae; central dorsal setae shorter than lateral and posterior marginal setae; subterminal setae (J5) reaching to or slightly beyond posterior margin of dorsal plate, with terminal setae (Z5) quite long. Approximately 18 pairs of setae bordering dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I greatly enlarged, robust, and peglike or spinelike; ventral setae of trochanter I enlarged and spinelike with proximal posteriolateral seta much more robust than others; setae pd 1 and ad 1 of femur I subequal in length, with pd 1 seta somewhat longer; anterior seta of coxae II and III and seta of coxa IV relatively short, stout, and spinelike to peglike; posterior seta of coxae II and III greatly enlarged, robust, and peglike; ven-



Figs. 150-154. *Laelaps paraspinosus* Tipton, female. (150) venter; (151) dorsum, scale = 100μ; (152) ventral view of tarsus II; (153) ventral view of tarsus III; (154) ventral view of tarsus IV, scale = 50μ.



Figs. 155-156. *Laelaps paraspinosus* Tipton, male. (155) venter; (156) dorsum, scale = 100μ.

tral anterolateral margin of coxa IV with serrated, acute, spurlike process; tarsi II, III, and IV each with 4 to 6 rather robust, blunt to pointed preapical setae; most other leg setae setaceous and normally developed; however, some often rather robust and spinelike.

Male: (Figs. 155-156) Gnathosomal setae short, robust, and spinelike; hypostomal setae setaceous with medial hypostomal setae longer than others, yet reaching about half distance to gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long, each extending in length well beyond base of seta immediately posterior; holoventral plate rather narrow between coxae IV and throughout entire length, although somewhat expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 4 pairs of setaceous setae; adanal setae relatively short, robust, and spinelike, length less than distance to postanal seta; postanal seta robust and spinelike, and somewhat longer than adanal setae. Unarmed venter bearing 35 to 40 setaceous setae adjacent to holoventral plate, with an additional 15 to 20 setae on posteriolateral margin, setae closest to holoventral plate and coxae IV shorter with most posterior and lateral setae quite long. Metapodal plates rather elongate. Peritreme extending to level of middle of coxa II. Dorsal plate bearing 37 pairs of setaceous setae, setae px2 and px3 absent; length and position of setae as in female. Soft integument of opisthosoma bearing 15 to 20 pairs of setaceous setae. Both proximal and distal setae of coxa I enlarged, robust, and peglike or spinelike, subequal in length; proximal posteriolateral setae of trochanter I enlarged, robust, and peglike; setae pd 1 and ad 1 of femur I subequal in length and somewhat enlarged; anterior seta of coxae II and III and seta of coxa IV rather short, robust, and peglike; posterior seta of coxae II and III quite enlarged, robust, and peglike; ventral anterolateral margin of coxa IV serrated with slender spur; tarsi II, III, and IV each with 4 to 6 blunt, peglike to spinelike preapical setae; most other leg setae setaceous; however, some may be spinelike.

Collection records

Myosorex varius
South Africa (Caxton, Transvaal); Tipton, 1960
Aethomys namaquensis
South Africa (ORS); 1 coll. (1 female); AMP
Arvicanthis dorsalis
South Africa; Hirst, 1923
Lemniscomys griselda
South Africa; Zumpt, 1961

Rhabdomys pumilio
South Africa: Zumpt, 1961
Otomys sp.
South Africa (Pilgrims Rest, Transvaal); Tipton, 1960
Otomys irroratus
South Africa (Grahamstown); Hirst, 1925
South Africa (Van Riebeeck Nat. Res., Pretoria); 1+ coll; AMP Zumpt Collection
South Africa; 1 coll. (7 females, 2 ny.); AMP

REMARKS.— *L. paraspinosus* bears several rather unique characters which distinguish it from all other *Laelaps* species: a great many setae ventrally posterior to coxae IV, lateral to genital and anal plates, and posterolateral to dorsal plate; all coxal setae and some ventral leg setae short, robust, and spinelike or peglike; dorsal setae px3 absent with some dorsal setae positioned differently from other *Laelaps* species.

This taxon is known only from South Africa and has been collected from several different hosts, primarily *Otomys* species.

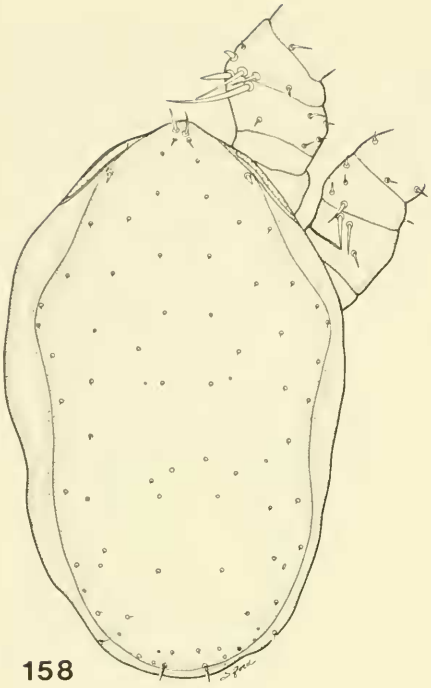
Laelaps (*Laelaps*) *bocquieri* Taufflieb

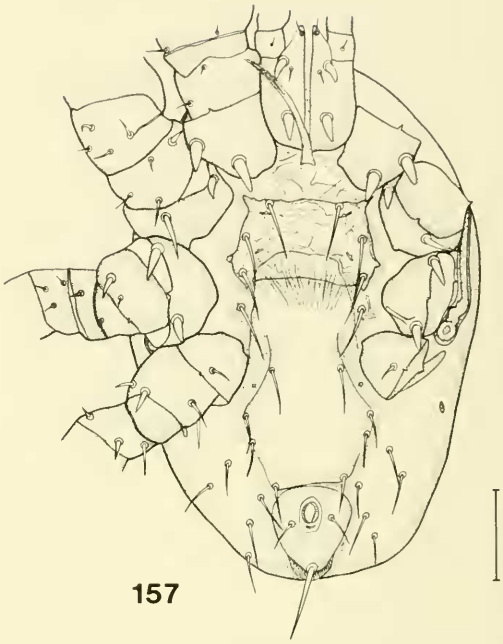
Figs. 157-163

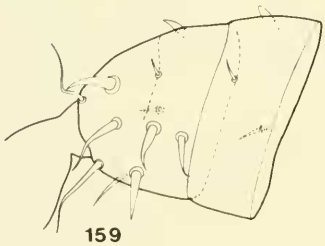
Laelaps bocquieri Taufflieb, 1962, Acarologia t. IV, Fasc. 4:497-499 (Holotype: Brazzaville, Congo; Pers. coll. of R. Taufflieb, Dakar, Senegal).

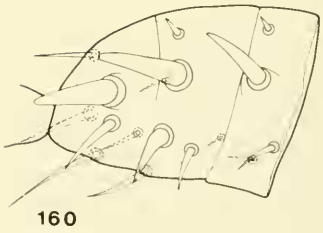
DESCRIPTION.— *Female*: (Figs. 157-161) Dorsal plate length 574 μ, width 365 μ. Gnathosomal setae very robust and peglike; lateral hypostomal setae robust and peglike; medial hypostomal and distal hypostomal setae slender, short, and setaceous. Posterior margin of sternal plate slightly invaginated, invagination reaching no further than level of 3rd sternal setae; setae st. 1 of moderate length, reaching slightly more than halfway between setae st. 2 and st. 3. Anterior flap of genital plate overlapping posterior margin of sternal plate to level of 2nd pair of sternal pores; distance between 1st genital setae and 4th genital setae subequal; distance between 2nd genital setae distinctly greater than distance between 3rd genital setae; greatest width of genital plate at level of 2nd genital setae. Anal plate somewhat oval in general shape, longer than wide, with anterior and lateral margins rounded; adanal setae slender and of moderate length but not extending to base of postanal seta; adanal setae set at level slightly posterior to middle of anal orifice. Unarmed venter bearing 5 pairs of setaceous setae adjacent to genital and anal plates, no setae on posterior and lateral margins of body; metapodal plate small, oval. Peritreme extending to level of middle or anterior of coxa I. Dorsal plate bearing 30 to 32 pairs of mostly setaceous setae; all dorsal setae except setae r1, r2, s1, and Z5, extremely minute; setae r2 short and spinelike, setae r1 rather robust, and setae s1 and Z5 short and setaceous; position of setae, particular setae absent, not determined because of extremely small size of setae present. Only one pair of setae apparently bordering dorsal opisthosoma on soft integument. Both proximal and distal setae of coxa I extremely robust and peglike; seta ad 1 of femur I rather short and spikelike, seta pd 1 of femur I about twice as long and more setaceous; anterior seta of coxae II and III quite robust and spinelike; posterior seta of coxa II more setaceous; posterior seta of coxa III quite robust and peglike; seta of coxa IV slender and setaceous; all preapical setae of tarsus II setaceous, most with slightly enlarged bases; tarsi III and IV each with one or two blunt preapical setae and several other pairs on tarsi blunt or spinelike; many other leg setae short and spinelike to setaceous.

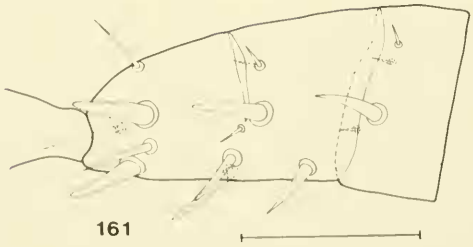
Male: (Figs. 162-163) Gnathosomal setae short, extremely robust, and peglike; lateral hypostomal setae somewhat robust, recurved, and peglike; medial and distal hypostomal setae slender, setaceous, and of medium length. Ventral setae, except adanal and postanal setae, of moderate length, extending in length slightly beyond base of setae immediately posterior; holoventral plate rather broad between coxae II and III, somewhat narrowing between coxae IV, and slightly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing only 4 pairs of setaceous setae; adanal setae slender and of moderate length, extending distinctly beyond base of postanal seta; adanal setae set near level of middle of anal orifice; postanal seta considerably more robust and longer than adanal setae. Metapodal plates rather small, elongate-oval; unarmed venter bearing 4 pairs of setaceous setae. Peritreme extending to middle or anterior of coxa I. Dorsal plate setae as in female.



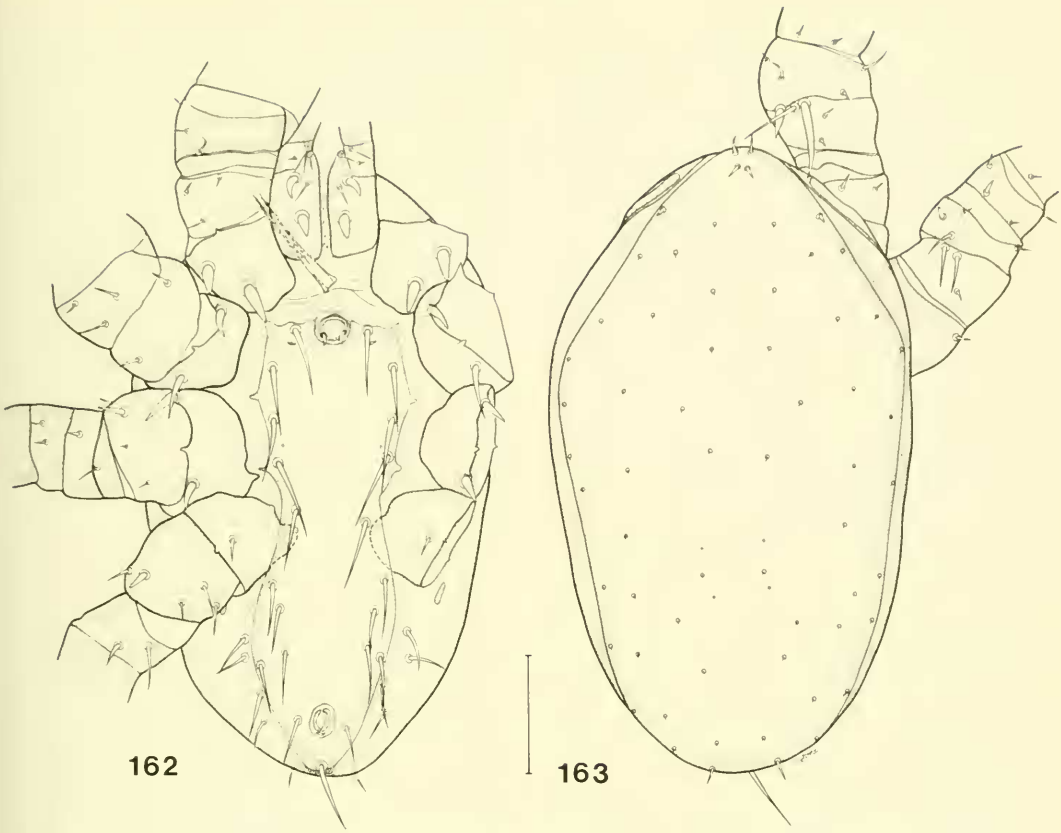








Figs. 157-161. *Laelaps bocquieri* Taufflieb, female. (157) venter; (158) dorsum, scale = 100μ; (159) ventral view of tarsus II; (160) ventral view of tarsus III; (161) ventral view of tarsus IV, scale = 50μ.



Figs. 162-163. *Laelaps bocquieri* Taufflieb, male. (162) venter; (163) dorsum, scale = 100μ.

Both proximal and distal setae of coxa I greatly enlarged, robust, and peglike; seta ad 1 of femur I short, robust, and spinelike, seta pd 1 at least twice as long and rather robust; anterior seta of coxae II and III somewhat enlarged and spinelike; posterior seta of coxa II of moderate length and setaceous; posterior seta of coxa III rather short, robust, and peglike; seta of coxa IV slender and setaceous; tarsus I with 1 blunt preapical seta, tarsus II with 3 moderately long, blunt setae, 1 being preapical, and tarsus IV with 4 blunt setae, 2 being preapical; other leg setae mostly setaceous; however, some short and spinelike.

Collection records

Chryssochloris leucorrhina
Congo (Brazzaville); 24 females, 18 males; Taufflieb, 1962

Remarks.— *L. bocquieri* differs from all other *Laelaps* species in several unique characters: gnathosomal and lateral hypostomal setae short, robust, and peglike; both setae of coxa I, anterior seta of coxa II, and both setae of coxa III robust and peglike or spinelike; posterior seta of coxa II long and setaceous; seta ad 1 of femur I short and spinelike with seta pd 1 twice as long; almost all dorsal setae minute, setae Z5, r1, and s1 short and setaceous and setae r2 short and spinelike.

L. bocquieri has been reported only from *Chryssochloris leucorrhina* in the Congo.

Laelaps (*Laelaps*) *breviperitremus* (Garrett and Strandtmann)

Figs. 164-167

Tur breviperitremus Garrett and Strandtmann, 1967, J. Med. Ent. 4(2):240-246 (Holotype: Clanwilliam, South Africa; U. S. National Museum, Washington, D.C.)

Laelaps breviperitremus: Furman, 1972, BYU Sci. Bull., Biol. Ser. 17(3):1-58.

Description.— *Female*: (Figs. 164-165) Idiosoma length 890 μ. Gnathosomal setae short, robust, and spinelike; hypostomal setae mostly setaceous, with medial hypostomal setae shorter, reaching approximately halfway to base of gnathoso-

mal setae. Posterior margin of sternal plate moderately invaginated, at least to level of 3rd sternal setae; all 4 pairs of sternal setae short, robust, and spinelike; anterior flap of genital plate overlapping posterior margin of sternal plate very slightly if at all; genital plate expanded considerably posterior to coxae IV and set very close to anal plate with posterior margin invaginated to accommodate anal plate; 3 pairs of genital setae rather short, robust, and spinelike, and only first 3 pairs set on genital plate; distance between 1st genital setae much less than distance between 4th genital setae, and distance between 2nd genital setae distinctly less than distance between 3rd genital setae; greatest width of genital plate at level of 3rd genital setae. Anal plate roundly triangular, almost as wide as long; adanal setae of moderate length, extending somewhat beyond base of postanal seta; adanal setae at level slightly posterior to middle of anal orifice; postanal seta very large, rather long and robust. Unarmed venter bearing approximately 12 to 14 pairs of setaceous setae, all rather long and most barbed; metapodal plates irregularly oval, slightly longer than wide. Peritreme very short, extending no further than posterior of coxa II. Forty-one pairs of setae associated with dorsal plate; more anterior setae short, robust, and spinelike, with posterior and posterior marginal setae longer and more setaceous; subterminal setae (J5) long and slender with terminal setae somewhat longer and more robust. Approximately 12 pairs of slender, setaceous setae border dorsal opisthosoma of soft integument. Both proximal and distal setae of coxa I robust, blunt, and peglike, with proximal seta somewhat larger; setae ad 1 and pd 1 of femur I subequal in length; proximal posterior seta of trochanters I and II short, robust, and peglike; anterior seta of coxae II and III of moderate length and setaceous, yet somewhat robust basally; seta of coxa IV short and III rather short, robust, and peglike; tarsi II, III, and IV each with 3 to 5 blunt, peglike preapical setae; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

Male: (Figs. 166-167) Gnathosomal and hypostomal setae setaceous, with gnathosomal setae somewhat more robust; medial hypostomal setae of moderate length, reaching almost to base of gnathosomal setae. Ventral setae, except adanal and postanal setae, rather long and slender, extending well beyond base of adjacent posterior setae; holoventral plate rather broad between coxae II and III, greatly narrowing between coxae IV, and greatly expanded posterior to coxae IV; expanded area between genital setae and anal orifice bearing 5 pairs of setaceous setae; adanal setae of moderate length, extending well beyond base of postanal seta; adanal setae set near middle of anal orifice; postanal setaceous; posterior seta of coxae II and seta somewhat longer than adanals but much more robust and spinelike. Metapodal plates inapparent, apparently fused to lateral extension of holoventral plate; unarmed venter bearing approximately 10 to 12 pairs of slender setaceous setae adjacent to holoventral plate. Peritreme short, extending no further than posterior of coxa II. Dorsal plate bearing 40 pairs of setaceous setae; most dorsal setae of moderate length, usually greater than distance between adjacent setae; subterminal setae (J5) of medium length, extending well beyond posterior margin of dorsal plate, but considerably shorter than terminal setae. Both proximal and distal setae of coxa I setaceous, proximal seta somewhat longer than distal seta; setae pd 1 and ad 1 of femur I subequal in length; anterior seta of coxae II and III, posterior seta of coxae II and III, and seta of coxa IV all setaceous, but some may be robust basally; some preapical setae of tarsi II, III, and IV robust and spinelike; most other leg setae setaceous and normally developed; however, some may be shorter and rather spinelike.

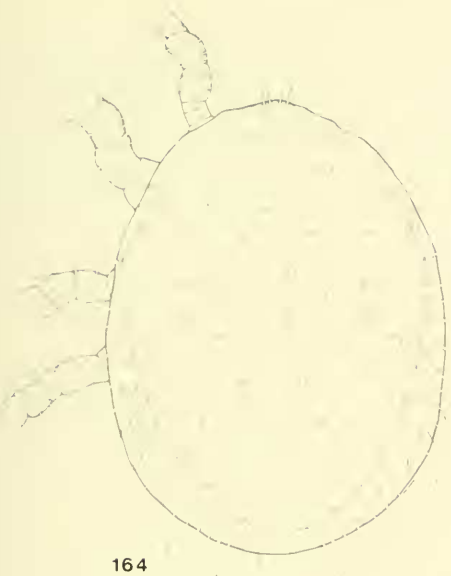
Collection records

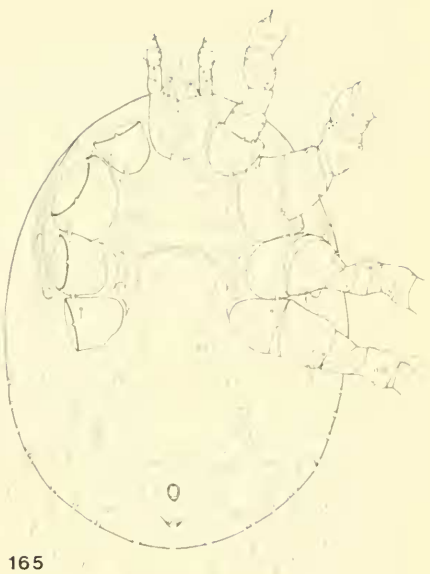
Acomys subspinosus

South Africa (Pakhuis Pass, Clanwilliam, Transvaal): 28 females (type specimens); Garrett and Strandtmann, 1967

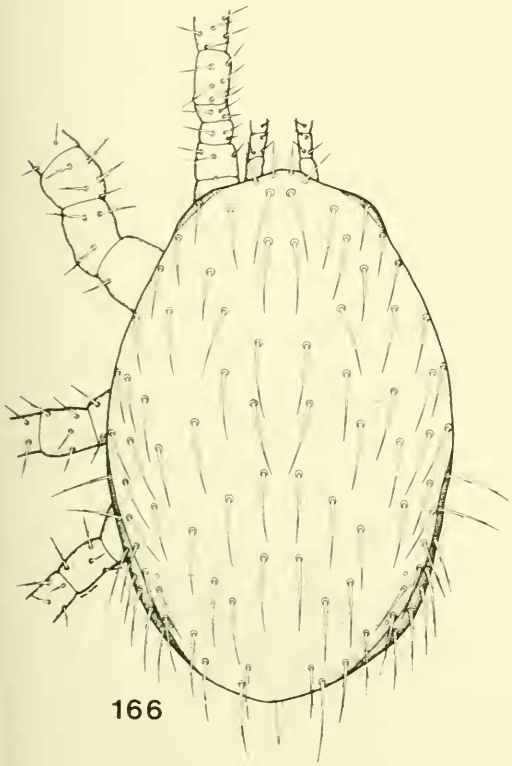
South Africa (Goudveld, Cape Prov.); 29 females, 1 male, 3 ny.; Garrett and Strandtmann, 1967

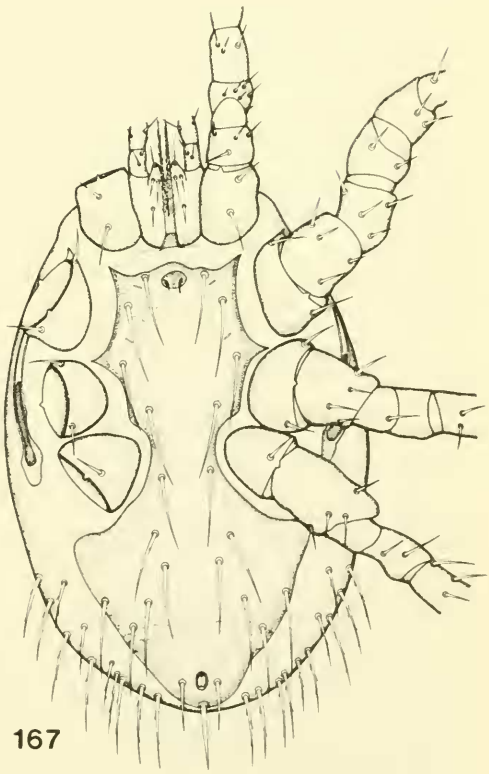
Remarks.— Garret and Strandtmann (1967) originally placed *L. breviperitremus* in the genus *Tur* because of many morphological characters possessed in common with *Tur* which differ from any other *Laelaps* species. Some of these distinguish-





Figs. 164-165. *Laelaps breviperitremus* (Garrett and Strandtmann), female. (164) venter; (165) dorsum; redrawn from Garrett and Strandtmann (1967).





Figs. 166-167. *Laelaps breviperitremus* (Garrett and Strandtmann), male. (166) venter; (167) dorsum, redrawn from Garrett and Strandtmann (1967).

ing characters are: very short peritreme, extending to posterior of coxa II; many short, robust, spinelike setae ventrally and dorsally; only three pairs of setae on genital plate; greatly expanded genital plate; plus other less obvious phenotypic differences.

L. breviperitremus is known only from *Acomys subspinosus* in South Africa.

Host-Parasite Relationships

For the most part, species of *Laelaps* in Africa are associated with myomorph rodents and more particularly rodents of the subfamily Murinae. However, there are some exceptions to this statement. For example, *L. transvaalensis* and *L. paraspinosus* were collected from *Otomys* sp. (subfamily Otomyinae) more frequently than from other hosts, but they were collected from murine rodents as well. *L. brandbergensis* has been collected principally from *Petromyscus* sp. (subfamily Dendromurinae), but again some specimens were collected from murine rodents. *L. congoicola*, *L. moucheti*, *L. aethiopicus*, and *L. bocquieri* are known only from single type collections in which the hosts were not identified beyond "rat" or "rodent" or the specific identification of the host cannot be confirmed. In the northern part of Africa gerbils (Gerbillinae) are frequently associated with species of *Laelaps*, but the *Laelaps* species involved are ubiquitous and are associated with such a variety of hosts that the true host-parasite relationship is obscure. Contaminations which may have occurred in the field or laboratory may account for other unusual associations recorded in the list given below. Specimens which were actually found on nonmurine hosts likely represented spurious associations.

New collection records of species of *Laelaps* from the African Mammal Project. (ORS = Orange River Survey)

Order Insectivora
- Superfamily Erinaceoidea
  - Family Erinaceidae
    - Subfamily Erinaceinae
      - *Atelerix albiventris*
        - *L. keegani* - Upper Volta
- Superfamily Macroscelidoidea
  - Family Macroscelididae
    - *Elephantulus intufi*
      - *L. keegani* - South Africa (ORS)
      - *L. simillimus* - South Africa
      - *L. vansomereni* - South Africa
    - *Elephantulus myurus*
      - *L. fritzumpti* - South Africa (ORS)
      - *L. liberiensis* - South Africa (ORS)
    - *Elephantulus rupestris*
      - *L. fritzumpti* - South Africa (ORS)
    - *Macroscelides proboscideus*
      - *L. fritzumpti* - South Africa (ORS)
      - *L. liberiensis* - South Africa (ORS)
      - *L. simillimus* - South Africa (ORS)
      - *L. transvaalensis* - South Africa (ORS)
- Superfamily Soricoidea
  - Family Soricidae
    - Subfamily Crocidurinae
      - *Crocidura hirta*
        - *L. liberiensis* - Rhodesia
      - *Crocidura* sp.
        - *L. keegani* - Upper Volta
        - *L. liberiensis* - Ghana
        - *L. roubaudi* - Nigeria
      - *Sylvisorex gemmeus*
        - *L. lavieri* - Ghana

Order Chiroptera
- Suborder Megachiroptera
  - Family Pteropidae
    - Subfamily Pteropinae
      - *Hypsignathae monstrosus*
        - *L. lavieri* - Ivory Coast
        - *L. liberiensis* - Ivory Coast
- Suborder Microchiroptera
  - Family Nycteridae
    - *Nycteris arge*
      - *L. lavieri* - Upper Volta
    - *Nycteris hispida*
      - *L. liberiensis* - Mauritania
    - *Nycteris macrotis*
      - *L. liberiensis* - Senegal
  - Family Rhinolophidae
    - Subfamily Rhinolophinae
      - *Rhinolophus clivosus*
        - *L. vansomereni* - South Africa
      - *Rhinolophus simulator*
        - *L. liberiensis* - Rhodesia
    - Subfamily Hipposiderinae
      - *Hipposideros baetus*
        - *L. lavoipierrei* - Ivory Coast
      - *Hipposideros caffer*
        - *L. benoiti* - Ivory Coast
        - *L. lavieri* - Ivory Coast
        - *L. setzeri* - Ivory Coast
      - *Hipposideros commersoni*
        - *L. malacomys* - Ivory Coast
      - *Hipposideros cyclops*
        - *L. lavieri* - Ivory Coast
  - Family Vespertilionidae
    - Subfamily Vespertilioninae
      - *Eptisicus capensis*
        - *L. liberiensis* - South Africa (ORS)
      - *Scotophilus nigrita*
        - *L. setzeri* - Ivory Coast
  - Family Molossidae
    - *Tadarida leonis*
      - *L. liberiensis* - Senegal
    - *Tadarida major*
      - *L. grenieri* - Upper Volta
      - *L. liberiensis* - Upper Volta
    - *Tadarida midas*
      - *L. simillimus* - South Africa
    - *Tadarida pumila*
      - *L. liberiensis* - Togo

Order Primata
Family Lorisidae
Subfamily Galaginae
Galago senegalensis
L. liberiensis - Upper Volta
Family Cercopithecidae
Subfamily Cercopithecinae
Cercopithecus mitis
L. liberiensis - Rhodesia
Erythrocebus pata
L. liberiensis - Upper Volta

Order Lagomorpha
Family Leporidae
Lepus saxatilis
L. liberiensis - Botswana

Order Rodentia
Suborder Hystricomorpha
Superfamily Bathyergoidea
Family Bathyergidae
Cryptomys hottentotus
L. liberiensis - Botswana, South Africa
L. transvaalensis - South Africa
L. vansomereni - South Africa
Family Thryonomyidae
Thryonomys swinderianus
L. liberiensis - Rhodesia
Superfamily Octodontoidea
Family Petromyidae
Petromus typicus
L. transvaalensis - South Africa (ORS)
Suborder Myomorpha
Superfamily Muroidea
Family Cricetidae
Subfamily Gerbillinae
Desmodillus auricularis
L. fritzumpti - South Africa (ORS)
L. liberiensis - South Africa (ORS)
Desmodilliscus braueri
L. liberiensis - Upper Volta
Gerbillus paeba
L. fritzumpti - South Africa (ORS)
L. liberiensis - South Africa (ORS)
L. vansomereni - Botswana
Tatera brandsi
L. fritzumpti - South Africa (ORS)
Tatera gambiana
L. liberiensis - Senegal
Tatera guineae
L. liberiensis - Guinea
Tatera kempi
L. keegani - Dahomey
L. liberiensis - Dahomey, Ghana, Ivory Coast, Upper Volta
L. myomys - Upper Volta
L. roubaudi - Ivory Coast
Tatera leucogaster
L. fritzumpti - South Africa (ORS)
L. lavieri - South Africa (ORS)
L. liberiensis - South Africa (ORS), Botswana
L. simillimus - South Africa
L. transvaalensis - South Africa
L. vansomereni - South Africa
Taterillus gracilis
L. liberiensis - Upper Volta
Family Muridae
Subfamily Dendromurinae
Dendromus melanotis
L. liberiensis - South Africa (ORS)
Malacothrix typicus
L. liberiensis - South Africa (ORS)
Steatomys caurinus
L. liberiensis - Ivory Coast
Petromyscus collinus
L. brandbergensis - South Africa (ORS)
L. fritzumpti - South Africa (ORS)
Subfamily Murinae
Acomys cahirinus
L. liberiensis - Ghana
L. setzeri - Ghana
Acomys spinosissimeus
L. acomys - Rhodesia
Aethomys chrysophilus
L. fritzumpti - South Africa (ORS), Rhodesia
L. lavieri - South Africa (ORS), Rhodesia
L. liberiensis - South Africa (ORS), Rhodesia, Botswana
L. malacomys - Rhodesia
L. simillimus - Botswana, South Africa, Rhodesia
L. tillae - South Africa
L. transvaalensis - South Africa
L. vansomereni - South Africa (ORS), Rhodesia
L. zumpti - Rhodesia
Aethomys namaquensis
L. brandbergensis - South Africa (ORS)
L. fritzumpti - Botswana, South Africa (ORS)
L. liberiensis - South Africa (ORS)
L. paraspinosus - South Africa (ORS)
Aethomys selindensis
L. vansomereni - Rhodesia
Arvicanthis niloticus
L. keegani - Ghana, Ivory Coast, Nigeria, Senegal
L. liberiensis - Ghana, Ivory Coast, Nigeria
Cricetomys emini
L. liberiensis - Upper Volta
Cricetomys gambianus
L. liberiensis - Nigeria
L. myomys - Upper Volta
Dasymys foxi
L. roubaudi - Nigeria
Dasymys incomptis
L. liberiensis - Rhodesia
L. roubaudi - Ivory Coast
Dephomys defua
L. liberiensis - Ghana
L. parasimillimus - Ivory Coast
Grammomys dolichurus
L. liberiensis - Upper Volta
Hybomys trivirgatus
L. grenieri - Ivory Coast
Hylomyscus alleni
L. liberiensis - Togo
Hylomyscus sp.
L. liberiensis - Ghana
Lemniscomys barbarus
L. grenieri - Ghana, Upper Volta
Lemniscomys griselda
L. liberiensis - South Africa
L. simillimus - South Africa, Rhodesia

L. tillae - South Africa, Rhodesia
L. vansomereni - South Africa
Lemniscomys macculeus
L. grenieri - Ivory Coast
L. lavieri - Ivory Coast
Lemniscomys striatus
L. grenieri - Ghana, Ivory Coast, Nigeria, Togo
L. lavieri - Togo
L. liberiensis - Nigeria, Togo
Lophuromys sikapusi
L. grenieri - Nigeria
L. lavieri - Ghana
L. lavoipierrei - Ghana, Ivory Coast, Nigeria
L. liberiensis - Ghana
Malacomys edwardsi
L. malacomys - Ghana, Ivory Coast
Malacomys longipes
L. liberiensis - Ivory Coast
L. malacomys - Ghana, Ivory Coast
L. parasimillimus - Ivory Coast
L. setzeri - Togo
Mastomys albicaudatus
L. liberiensis - South Africa (ORS)
Mastomys erythroleucus
L. liberiensis - Ivory Coast
Mastomys natalensis
L. fritzumpti - South Africa (ORS)
L. lavieri - Ghana, South Africa (ORS)
L. lavoipierrei - Ivory Coast, Upper Volta
L. liberiensis - Botswana, Rhodesia, South Africa (ORS), Dahomey, Ghana, Ivory Coast, Nigeria, Senegal, Togo, Upper Volta
L. myomys - Upper Volta
L. setzeri - Togo
L. simillimus - South Africa (ORS)
L. tillae - South Africa
L. transvaalensis - South Africa (ORS)
L. vansomereni - South Africa, Rhodesia
Mus haussa
L. lavieri Nigeria
Mus minutoides
L. benoiti - Ghana, Rhodesia
L. fritzumpti - South Africa (ORS)
L. lavieri - Ghana, Ivory Coast, South Africa (ORS), Rhodesia
L. liberiensis - South Africa (ORS)
L. zumpti - South Africa (ORS), Rhodesia
Mus musculoides
L. benoiti - Ghana, Ivory Coast
L. keegani - Ghana
L. lavieri - Ghana, Ivory Coast, Upper Volta
L. lavoipierrei - Ghana
L. liberiensis Senegal, Togo
L. setzeri Togo
L. thamnomys Togo
Mus setulosus
L. benoiti - Ghana, Ivory Coast
L. lavieri - Ghana, Ivory Coast
L. malacomys Ivory Coast
Myomys daltoni
L. liberiensis - Ghana, Ivory Coast, Senegal, Upper Volta
L. myomys - Ghana, Ivory Coast, Nigeria, Senegal, Upper Volta
L. transvaalensis - Senegal
Praomys tullbergi
L. benoiti - Ghana, Togo
L. grenieri - Nigeria, Togo
L. lavieri - Ghana, Ivory Coast
L. lavoipierrei - Ivory Coast
L. liberiensis - Ghana, Nigeria, Togo
L. roubaudi - Ghana
L. setzeri - Ghana, Ivory Coast, Nigeria, Senegal, Togo
L. thamnomys - Togo
Rattus rattus
L. nuttalli - Madagascar, Mauritius
L. setzeri - Ivory Coast
Rhabdomys pumilio
L. fritzumpti - South Africa (ORS)
L. liberiensis - South Africa (ORS)
L. peregrinus - South Africa (ORS)
L. simillimus - South Africa
L. tillae - South Africa
L. transvaalensis - South Africa
L. vansomereni - South Africa
Sacrostomus campestris
L. fritzumpti - South Africa (ORS)
L. lavieri - South Africa (ORS)
L. liberiensis - South Africa (ORS)
L. tillae - Rhodesia
L. transvaalensis - South Africa
L. vansomereni - South Africa (ORS)
Thallomys paedulcus
L. fritzumpti - South Africa (ORS)
Thamnomys rutilans
L. liberiensis - Togo
L. thamnomys - Ivory Coast, Togo
Uranomys oweni
L. grenieri - Senegal
Uranomys ruddi
L. grenieri - Ivory Coast
L. lavoipierrei - Ghana
L. liberiensis - Ivory Coast
Subfamily Otomyinae
Otomys angoniensis
L. transvaalensis - Rhodesia, South Africa (ORS)
Otomys irroratus
L. liberiensis - South Africa (ORS)
L. paraspinosus - South Africa
L. transvaalensis - South Africa
Parotomys brantsi
L. fritzumpti - South Africa (ORS)
Suborder Sciuromorpha
Superfamily Sciuroidea
Family Sciuridae
Subfamily Sciurinae
Funisciurus pyrrhopus
L. liberiensis - Ivory Coast
Order Carnivora
Family Mustelidae
Subfamily Mustelinae
Ictonyx striatus
L. lavieri - South Africa (ORS)
L. liberiensis - South Africa (ORS)
Family Viveridae
Subfamily Viverinae
Genetta servalina
L. liberiensis - Senegal

Genetta villiersi
L. lavieri - Ivory Coast
L. liberiensis - Ivory Coast
Subfamily Herpestinae
Crossarchus obscurus
L. liberiensis - Ivory Coast
Herpestes sanguineus
L. liberiensis - Rhodesia
Family Felidae
Subfamily Felinae
Felis lybicae
L. keegani - Upper Volta

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